February Volume 122 No. 2 50 Cents
Pioneer Journal of the Industry

FARM CHEMICALS

UNIVERSITY OF MINNESOTA AGRICULT... INSTITUTE OF AGRICULTURE

Special report on NPFI's pilot fertilizer salesmen's school

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FIELD REPORT

TO: B.D.

Re: [redacted]'s Order

Herewith [redacted]'s carload order. Looks like beginning of good volume from this account. Their P.A. really opened up when I showed him our Written Guarantee policy. Explained to him that every Hudson bag he pays for is guaranteed to be a bag he can use. Or we pay!

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Ask for grade ... all our production is high grade, ranging from 77% B.P.L. down to 72% B.P.L. Our rock is quality controlled by specialists and blended to your specifications. Rock is also ground to order and a screen analysis of each car sent to the customer before shipment.

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PUBLICATIONS AUDIT

The national business magazine for the fertilizer and pesticide industries, FARM CHEMICALS, serves primarily those persons responsible for management, marketing and production. It has a qualified circulation for selected executive and supervisory persons within specified segments of these industries, as well as in certain closely allied fields. Subscription rates to all others are: in the U.S., its possessions, Canada, Cuba and Panama: $6.00; in other countries: $7.50. Single copy 50 cents. Established in 1894 as *The American Fertilizer*.

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FARM CHEMICALS

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THE COVER PICTURE

Two Ohio salesmen listen to Arlan Woltemath, a midwest field representative of the National Plant Food Institute, explain how to use one selling tool for fertilizer—the demonstration. Dan Bozzacco of Massillon (left) and Bob Pape, Marietta, both with The Smith Agricultural Chemical Company, were in their home-office city for the pilot Fertilizer Salesmen's School. You can sit in for a fast review by turning to the exclusive report on page 18.

Farm Chemicals Photo by Howard Frisbee

Consistency wins in the bag business too!

No horseshoe player can pile up points merely by swinging his arms. It's *pitching ringers consistently* that makes him an expert.

In the bag business, too, good delivery and smooth follow through—without lost motion—are sure proof of experience and know-how.

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LETTERS

ON THE NEW FC

Cleveland, Ohio

Dear Sir:

... With reference to Theodore Nowak's article in the January issue, I feel that the eleven questions he proposes as needing answers in the article, "Keystone of Future Profits," are excellent ...

Cordially yours,
J. C. COLE
DIAMOND ALKALI CO.

Cleveland, Ohio

Dear Sir:

... During our discussion last November, I did not realize you would be able to implement your plans for added emphasis on marketing so quickly. I wish to extend my congratulations ...

Yours very truly
R. E. SWACKHAMER
Commercial Development Dept.
DIAMOND ALKALI CO.

Washington, D. C.

Dear Sir:

... We like your new format and the emphasis you are placing on the importance of keeping the industry better informed on marketing methods ...

Sincerely yours,
LOUIS H. WILSON
Director of Information
NATIONAL PLANT FOOD INSTITUTE

Washington, D. C.

Dear Sir:

... I have looked through the format with a great deal of interest.

Certainly there is increasing interest among the members of the fertilizer industry to marketing and merchandising problems. Stressing these activities should add materially to your publication.

I do hope you will have great success in your new approach.

Sincerely yours,
RUSSELL COLEMAN
Executive Vice President
NATIONAL PLANT FOOD INSTITUTE

Kansas City, Mo.

Dear Sir:

... I certainly think that your approach to marketing and stressing that phase of the agricultural chemical business as a very critical and important segment is in true recognition of the times. The industry certainly needs improvement in this area and I know that FARM CHEMICALS will help the cause.

Sincerely,
DICK BALSER, Manager
Sales Promotion
Nitrogen Products
SPENCER CHEMICAL CO.

Urbana, Ill.

Dear Sir:

... I read with interest your publication FARM CHEMICALS and find it invaluable in keeping up to date with some of the technological developments in the Farm Chemicals Industry, particularly in regard to new kinds of fertilizer ...

Sincerely yours,
JACK V. BAIRD
Assistant Professor, Soils Extension
Department of Agronomy
UNIVERSITY OF ILLINOIS

Chicago, Illinois

Dear Sir:

... I believe you have hit it with the new format and editorial approach in FARM CHEMICALS ...

Very truly yours,
Z. Z. DWORKIN
Manager of Sales
GLENN CHEMICAL CO., INC.

Baltimore, Md.

Dear Sir:

... you and your editorial staff have done an excellent job of revamping and departmentalizing FARM CHEMICALS.

Relative to our discussions at the NAC Savannah meeting, I do believe you have "followed through" with your ideas of a new approach ...

Sincerely yours,
KENNETH B. NASH
Market Development—Pesticides
Chemicals Division
OLIN MATHIESON CHEMICAL CORP.

'EXAGGERATED' QUOTE

Washington, D. C.

Dear Sir:

... in the December issue of FARM CHEMICALS, page 43, third column, third paragraph, the clause "and added that of the 78 methods for phosphorus analysis" you incorrectly quoted. The number of methods does not exceed four; 78 is somewhat exaggerated.

Yours very truly,
DR. VINCENT SAUCHELLI
Chemical Technologist
NATIONAL PLANT FOOD INSTITUTE

MAINTENANCE TOOLS

Trona, Calif.

Dear Sir:

We were quite interested in the article "Economics of Preventive Maintenance" by Jesse C. Jessen of Du Pont. This appeared on pages 18–20 of your December issue.

We wish to obtain the full article. You did not have the space for Mr. Jessen's full discussion of the 18 basic tools. Could you obtain this for us?

Very truly yours,
STUART W. ROBISON
Industrial Engineer
Manufacturing Administration Office
AMERICAN POTASH & CHEMICAL CORP.

Ed. Note: Mr. Jessen has written: "We have forwarded a copy of the paper to Mr. Robison of American Potash and Chemical Corporation. Thank you for forwarding a request to us."

PARTICIPATION URGED IN REVISED CHECK SAMPLE WORK

The National Plant Food Institute is urging member companies and other firms that have chemical control laboratories to participate in the recently revised "Magruder Check Fertilizer Sample Work" program which is being sponsored jointly by the Association of American Fertilizer Control Officials and NPFI.

A check sample will be sent out monthly for analysis. All findings will be statistically analyzed and summarized, and a monthly report will be furnished to each participating laboratory —as a check on performance in relation to others.

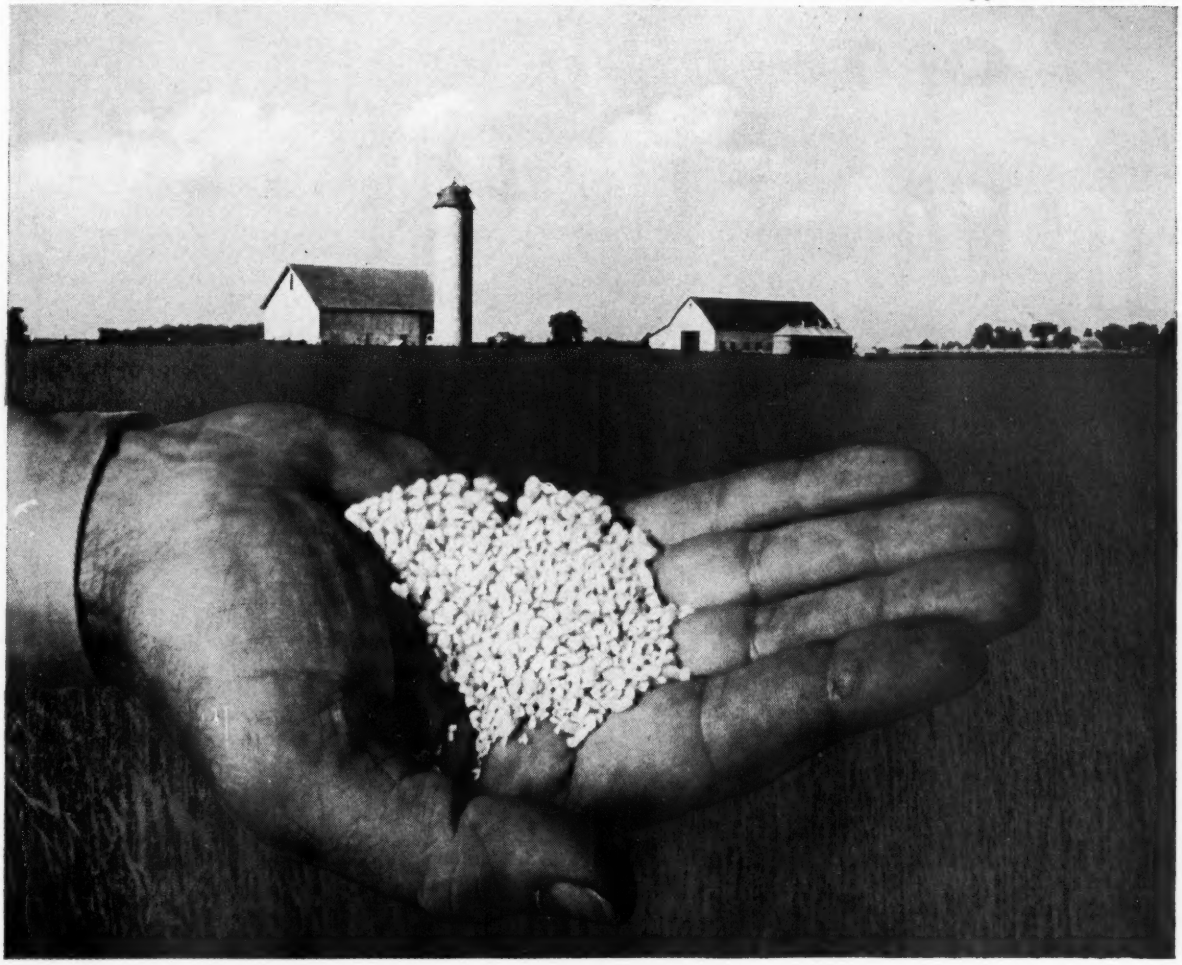
In 1922 there were about 30 chemists participating in the check sample work. By 1958 the number reached 129—about equally divided among fertilizer companies, commercial laboratories and state control agencies. F. S. Royster Guano Co. has always prepared and distributed the sample and the compiled chemical analyses. E. W. Magruder, who initiated the plan in 1922, was chief chemist for the company.

The program has these new features: statistical design for data analysis and "reports which are more meaningful than a simple listing of averages," samples from purified salts of known composition, and samples of uniform particle size—as well as "run-of-the-mill" samples.

"This work meshes in very well with the major research project on sampling and chemical analytical methods currently underway which is sponsored by NPFI with the cooperation of the AOAC (Association of Official Agricultural Chemists) and AAFCO," says Dr. Vincent Sauchelli, NPFI chemical technologist.

Details and application forms may be obtained from him—at NPFI, 1700 K Street, N. W., Washington 6, D. C.

Advertisements like this in full color are appearing every month during the fertilizer season in Farm Journal, Farm & Ranch, Progressive Farmer, and Capper's Farmer.



Hi-D®...the only ammonium nitrate that's granular!

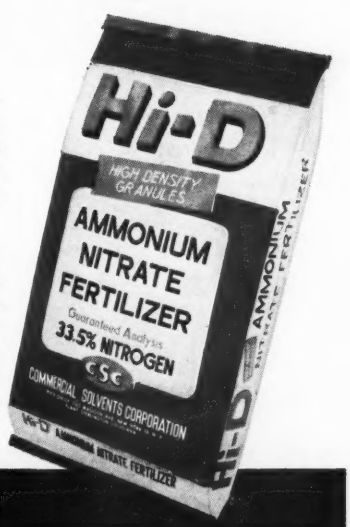
the helping hand that boosts your yield

Give your land the helping hand of Hi-D. See for yourself why Hi-D is better than any other ammonium nitrate.

Hi-D handles so well—in storage and in spreading. *Only Hi-D is granular.* High in density, Hi-D is super dry—has less tendency to pick up moisture prior to application even under humid field conditions. Result: Hi-D always flows freely—doesn't gum-up—won't clog, cake or bridge in the spreader. And still another advantage, you can get up to 20% more ammonium nitrate in the hopper to reduce loading stops.

Hi-D contains 33.5% of available nitrogen. This crop-boosting nitrogen comes in two equal "servings"—your crops get half *nitrate* nitrogen for vigorous early growth and half *ammonia* nitrogen for sustained follow-up feeding.

This year, let Hi-D help boost your yield. but remember—sound management calls first for soil testing, a liming program if needed, and the necessary balanced mixed fertilizer. Then, a supplementary feeding of nitrogen—the heart of the harvest. Make it Hi-D ammonium nitrate . . . see your dealer.



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DIMON can be used efficiently and economically in producing most high analysis formulations, and is particularly suited for ultra high analysis.

DIMON a granular product of uniform particle size and guaranteed chemical analysis, offers many advantages over conventional materials–lower material cost–increased production rates –a better conditioned fertilizer–reduced handling time–and a broader range of formulations.

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USPP maintains a field staff of technical representatives, who are at your service and are anxious to assist you in adapting **DIMŌN** to your particular processing for a more efficient and profitable operation. These representatives are conveniently located to give immediate assistance—For their services please contact **BRADLEY & BAKER.**

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GENERAL OFFICE: 100 Church Street, New York 7, N. Y.

WASHINGTON VIEWPOINT

F C

▸ *Investigations of monopoly practices will be more widespread. Probe into fertilizer industry pricing practices is scheduled.*

▸ *Stronger farm chemicals markets expected in 1959 as farmers spend $1 billion more for production items.*

▸ *How much do farmers really get in subsidies? This year, $1.9 billion of the record $7.3 billion farm program.*

Industrial bigness—and economic consequences of bigness—now head into one of the most uncertain periods in history. Federal investigations to determine monopoly practices are to be more widespread than in many previous years.

Bigness itself may become the prime test as to whether investigation is conducted. Investigations started this year will be limited to a few industries, but will set the pattern for probes over other industries later.

"Administered price" investigation by the Senate antitrust and monopoly subcommittee is a clear sign of the times. The fertilizer industry is scheduled for a probe into pricing practices—but indications are a beginning won't be made until next year.

Food industry probe by the Federal Trade Commission is an example of new anti-monopoly mood in official circles. Questionnaires have been sent to 1,000 business organizations involved in food distribution. Principal interest is industry concentration and what it does to prices.

The Justice Department now is laying the groundwork for even greater antitrust powers. It has asked Congress for, among other things, power to compel industries to produce documents during the investigative stage of antitrust proceedings, and to require prior notification of corporate mergers and acquisitions where capital involved is greater than $10 million.

Markets for farm chemicals are expected to be stronger during the 1959 growing season than in the past season. Farmers are expected to increase spending for production items by more than $1 billion this year. With growing emphasis on farm cost-farm price ratios, much of this increase is expected to go for farm chemicals—fertilizers and pesticides—not increased capital expenditures.

Gross farm income from 1958 crops was up about $3 billion over the previous year. At least half of this will go for purchases of postponed living items, needed production items and repairs, and higher interest and taxes. The rest is expected to be plowed back into proven production boosters which can be amortized in one year.

But 1959 may be the last year of large increases in production spending—according to agricultural economic forecasts. USDA predicts gross farm income in 1959—mostly spendable in 1960—will drop about $1 billion. Officials believe this will slow, but not stop, the spiral of farm production expenditures next year. One view is that production expenditures may level out at about $25 billion a year—up a half billion from 1958.

Since 1955, farmers have increased production expenditures by $2.7 billion—an average of about $900 million a year. During each of the past two years, this increase was $1 billion a year.

Farm program spending this fiscal year, ending June 30, will total $7.3 billion—the biggest on record, and as much as the U.S. spends on its entire missile program. The President's budget for fiscal 1960 calls for a reduction to $6.5 billion.

Odds are that the President's estimate is too low. It's based on an assumption that Congress will cooperate (so far it isn't on other programs), and that 1959 farm production will be 7 per cent less than record 1958 output.

Agricultural Conservation Program (ACP) would be cut to $100 million in 1960, under the President's budget. This change does not affect 1959 ACP participation since Congress last year authorized the usual $250 million to be spent on conservation practices installed this year.

If Congress buys the cut—and odds still are against it—USDA county committees would decide how the money would be spent. Each state would get its proportionate share of the $100 million—and county committees could either drop some practices, scale down some or all federal cost-share rates, or keep the present program until money ran out.

Fertilizer and lime practices—termed "temporary" by USDA—have been under fire within the USDA, which wants payments on them halted. Congress last year, however, said the USDA could not drop them—unless county committees asked that they be dropped.

Direct subsidies to farmers this fiscal year amount to $1.9 billion. Subsidies are paid directly for Soil Bank participation, ACP, and wool and sugar act payments. Under each of these programs, the

What's Coming Next Month

The third issue in our new marketing approach will continue our main purpose—to help you sell more merchandise . . . *profitably*. We know you'll be on the look-out for . . .

■ SERVICE IS PROFITABLE

Everyone likes to read about success! Here's a story about a company that discovered the key to success in selling fertilizer as a dealer—then got so big they decided to start mixing their own brand of the stuff. How did they do it? Service! You'll profit from their ideas.

■ SELL QUALITY—NOT PRICE

This article is designed to bring you up-to-date on the latest fertilizer selling *methods* and *techniques*—as practiced by one of the most successful companies in the business. Points discussed: approach, overcoming objections, closing the sale, making quality pay off, effective use of selling time.

■ LIABILITY IS YOUR BUSINESS

Some farm chemicals companies have not set up necessary machinery to cope with legal problems that may arise. Each problem is *new* to them, costing thousands of dollars in claims—but even greater losses in prestige and good will. This article is invaluable to you because it's *backed up by detailed legal research* that explains court decisions in many states—on a variety of problems.

■ FITTING FERTILIZER TO NEEDS

The farmer, the county agent, the vocational agriculture teacher, and the dealer—all are partners in the farming community. How do you bring these forces into play to help fit the fertilizer program to meet specific needs? Be sure to read how one company does it

. . . in the new

FARM CHEMICALS BPA

WASHINGTON VIEWPOINT

government gets something in return, i.e., land retirement, installed resource conservation, increased production of products in short supply.

Price support and related programs are *not* considered direct subsidies. Generally, USDA puts out the money in the form of loans to farmers, and it gets commodities as collateral. Most of the commodities held by the government amount to forfeited collateral. Support spending this year is estimated at $3.1 billion, of which 70 per cent will be redeemed when the U.S. disposes of the commodities.

Who else gets subsidies? Under the heading of "aids and special services," the Budget lists these other subsidies:
Business—$1.5 billion on postal service, airline and maritime operating subsidies, navigation aids, patent service, rivers and harbors, etc.
Labor—$744 million for unemployment insurance and employment service and mine safety work.
Veterans—$5 billion for compensation and pension benefits, hospital, medical, readjustment programs.
International—$1.4 billion for economic aid (another $2.3 billion for mutual security).
Disputed—$1.2 billion for Public Law 480, the overseas surplus crop disposal law. Officials disagree over whether this should be charged to "Agriculture" or "international" because it is a key tool in the fight against world communism.

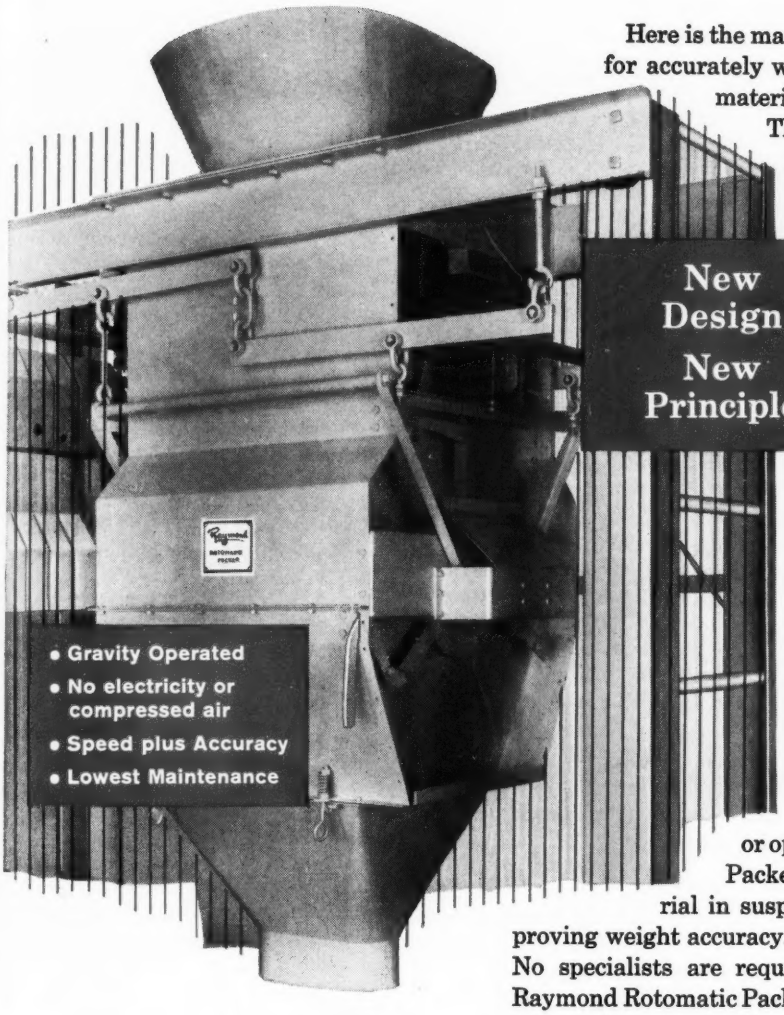
The Administration's farm program, presented to Congress in a special message from the White House, continues the policies of the past 5 years. Essentially, the message requests broader authority for the Secretary to establish price support levels.
Alternative plans are offered: Permit the Secretary to establish commodity support levels for wheat, tobacco and peanuts as much as 20 per cent below previous years' market price averages, and kill the parity formula—or keep the parity formula and permit supports from zero to 90 per cent of parity. Parity is the government's yardstick for determining farmers' relative position using 1910–14 as the base period.

Both approaches would permit further reductions in support levels in view of the surpluses.
Odds now stand against providing the Secretary more authority over support levels. Still—Benson's past successes in wresting concessions from Congress do not rule out approval of at least some of these requests.

Democrats in Congress—holding almost 2-to-1 majorities—plan to come up with a program of their own. Currently under consideration is a system of direct payments to farmers. Under the scheme, producers would get government checks making up the difference between domestic market prices and a higher level considered to be "fair."
Odds favor passage of some form of production payments, but only because of the big Democratic majorities. Veto is sure.

Announcing the Revolutionary

Raymond Rotomatic Packer



Here is the machine that is changing all standards for accurately weighing and packing free-flowing materials in open-mouth multi-wall bags!

The Raymond Rotomatic Packer is fully automatic, all-mechanical, and requires no outside source of power such as electricity or compressed air. It combines gravity operation with the even balance scale principle that delivers simplicity of operation, accurate weights, and high rate of production.

Practical bagging rates are limited only by the operator's ability to feed bags to the filling tube. The Raymond Rotomatic Packer handles 50 lb. bags up to 100 lb. bags with equal ease. Bag size changes take less than 60 seconds and the first new size bag is correctly weighed.

Practical variances in material density do not affect the accuracy or operation of the Raymond Rotomatic Packer. The machine design limits material in suspension to a minimum, further improving weight accuracy.

No specialists are required to maintain and service the Raymond Rotomatic Packer. Scale assembly can be adjusted by regular scale mechanics and any competent mechanic can service the unit.

Engineering, operation, and installation details are available from any Raymond Representative. For more details and information, write or call the Raymond Office nearest you.

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BAG CORPORATION

a division of Albemarle Paper Mfg. Co.
Middletown, Ohio

WHAT'S DOING IN THE INDUSTRY

COLLIER CARBON EXPANDS AMMONIA CAPACITY 20%

Collier Carbon and Chemical Corp. is expanding the capacity of its Brea, Calif., ammonia plant by 20 per cent.

Robert T. Collier, president, said that with today's stiff competition, the investment reflects confidence in expanding western agriculture and foreign markets.

C. F. Braun & Co. engineered the plant changes. Ehrhart and Associates, Inc., is the contractor. Completion is scheduled for mid-1959.

Capacity of anhydrous ammonia is expected to reach the five million ton mark this year in the U.S.—as a result of plants coming into production since January 1 or going onstream this year.

It is estimated by Business and Defense Services Administration that production of anhydrous ammonia during both 1956 and 1957 was slightly above 80 per cent of capacity. Five ammonia plants not included in 1957 statistics are on stream and five others are under construction or planned. Half of these new and proposed plants are or will be in the Pacific-Mountain region.

Use of anhydrous ammonia in American agriculture during the year ended June 30, 1958 increased 27.45 per cent over the previous year, reaching a total of 577,000 tons, according to a preliminary report from USDA.

SOLAR ACQUIRES SOHIO AMMONIA FACILITIES

Organization of Solar Nitrogen Chemicals, Inc., a new company jointly owned in equal proportions by The Standard Oil Co. (Ohio) and Atlas Powder Co., has been announced.

Solar will "engage in the manufacture and sale of agricultural and industrial chemicals; will acquire all of Sohio's present ammonia and related petrochemical facilities at Lima, O.; and will succeed to the business heretofore conducted by Sohio in these products."

Sohio Chemical Co., a wholly-owned subsidiary of Standard Oil, will continue to operate the plant and to act as sales agent for the new company. Edward F. Morrill, Sohio president, has been elected president of Solar. Edward J. Goett, executive vice president of Atlas Powder, has been elected vice president. There will be no change in personnel, product line, service policies or sales territories, the announcement said.

NPFI PUBLISHES FERTILIZER SALESMAN'S HANDBOOK

A *Fertilizer Salesman's Handbook* "designed to be a constant companion of the fertilizer dealer and salesman" has been published by the National Plant Food Institute (see page 18).

Six chapters are included: Knowing Your Customer, Knowing Your Product, Economics Furnishes Sales Points, Useful Facts and Figures, Terms and Definitions and Sources of Information and Other Aids to Selling.

A loose-leaf publication with a plastic binder permitting revisions or additions, the 220-page manual is available at $1.50 a copy from the Institute, 1700 K St., N.W., Washington 6, D.C.

Replacements and revisions will be issued by the Institute from time to time with instructions for incorporating them in the manual.

MERGER OF SMITH-DOUGLASS, WILSON & TOOMER IS OFF

Merger negotiations between Smith-Douglass Co. and Wilson & Toomer Fertilizer Co., first announced last September, have now been terminated.

Agreement could not be made on terms satisfactory to both boards of directors, according to a joint statement issued by Willard Ashburn, Smith-Douglass president, and Wallace Hicks, Wilson & Toomer president.

CYANAMID STOPS SELLING METHYL PARATHION TECH.

American Cyanamid Co. has discontinued the sale of methyl parathion technical. B. F. Bowman, marketing director of the Agricultural Div., said that greater emphasis will be placed on the sale of malathion and ethyl parathion technical, tradenamed Thiophos.

FAIRFIELD OFFERS CRAG FLY REPELLENT

Fairfield Chemicals, Food Machinery and Chemical Corp., will make Crag fly repellent available to formulators, either alone or in combination with Pyrenone. Crag fly repellent was developed by Union Carbide Chemicals Co.

THIS MONTH'S Meeting Highlights

Texas Agricultural Aviation Conference and Short Course on Pest Control

Memorial Student Center, A&M College of Texas, College Station

Feb. 22—Meeting of Texas Aerial Applicators Association will be held at 1:00 p.m. A social hour at 6:00 p.m., with this association as host, will be held at the American Legion Hall, Bryan, Tex.

Feb. 23—Welcome by Dr. R. E. Patterson, vice president for Agriculture, Texas A and M College System, followed by a "Symposium on Insect Control" presented by the Dept. of Entomology Staff of the college. After lunch, Dr. Wayne G. McCulley, Texas Agricultural Experiment Station, will lead a "Symposium on Brush and Weed Control." Discussion sessions on insect control problems and herbicide problems are scheduled. Chairman for the dinner is Corley Tedder, president of the Texas Aerial Applicators Association.

Feb. 24—During the a.m. session, talks will be presented on "Defoliants and Dessicants," "Plant Disease Control," "Business Management," "Aerial Seeding and Fertilizing," "Selective Control of Rough Fish," and "The Use of Airplanes in Government Insect Control Programs." After lunch, there will be a field demonstration of aircraft and equipment at Easterwood Airport.

10,000 hours . . . only $700 repair costs

Work record of first Michigan Tractor Shovel important since today's Michigans have same basic power train design

When the first Michigan Model 75A Tractor Shovel rolled out of Clark's Benton Harbor (Michigan) plant in 1954, company engineers *knew* it was good. But who could expect it to put in 10,000 working hours on a tough job . . . and still be "good enough to last many, many more years," (according to the satisfied owners, Indiana Farm Bureau's Indianapolis fertilizer plant). Five months a year, their "old" 1¼-yard Michigan Tractor Shovel operates on *a three-shift basis*—moving an average of 60,000 pounds of superphosphate and other materials *per hour* from storage piles to mixing units. It also handles mixed fertilizer, cleans spillage, and pushes freight cars.

Still has original tires, axles

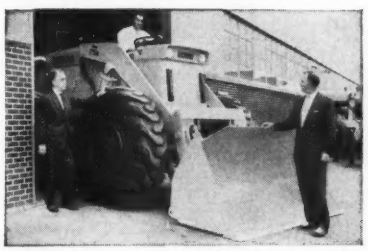
In service equivalent to 5 years' normal 8-hour-a-day use, replacement parts have cost only $700, according to Lewis Risinger, Master Mechanic. "And," he says, "we've *never broken an axle, or replaced a tire,* which is unusual in our operation. I need only three socket wrenches to take the whole power-train apart—it's a fast, simple job that sure cuts downtime."

Operator praises power shift transmission

"I've noticed," says Plant Supt., Melvin Leach, "that whenever there's a choice, operators always pick the Michigan. Even a new man learns to operate it in a hurry." Operator Bob Jefferson especially likes the "power shift and steer, the bucket action, and the fact you don't have to 'grind' gears and wheels to keep close to the pile."

Liked the first—bought four more

Since he authorized purchase of this first Michigan Tractor Shovel, Ben Scharrer, head of the Bureau's Fertilizer Division, has bought four more Michigans for Bureau plants in Indianapolis and Jefferson, Indiana. "One of the things I've been pleased to see," says Mr. Scharrer, "is that there have been no changes in the basic Michigan design. Except for natural wear, the first Michigan is as up-to-date as machines coming off the line today!"



6000th MICHIGAN NOW ON THE JOB

Michigan Tractor Shovel No. 6,000 —produced a little over two years after the first one—is now at work for Ohio Gravel Co., Cincinnati. It has the same all-Clark "flywheel to drive-wheel" power train as do the first and all other Michigan Tractor Shovels.

Michigan is a registered trade-mark of

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CLARK® EQUIPMENT

how to put MUSCLE in your

By ERWIN H. KLAUS

- *With a fully integrated program*
- *A fair price to buyer and seller*
- *A continuing customer relationship*
- *Responsibility for user satisfaction*
- *Sales effort applied along the whole distribution chain*

THE MANAGEMENT OF THIS COMPANY believes that the fertilizer industry, which is a billion dollar industry, has sold its products with a country store approach long enough and that consumer goods merchandising techniques should prove extremely beneficial." So declared Virginia-Carolina Chemical Corporation at the time it was searching for a merchandising manager whose assignment would be: "to develop information necessary to recommend the most profitable combination of price policy, products, sales promotion, advertising, distribution, customer service, and sales effort for each market."

If the fertilizer industry as a whole knows today that it has to build up its marketing muscles (and there is fresh evidence of this) it is barely beginning to do something about it. What is there to do? And why?

The fertilizer industry has about twice the market potential of its annual sales. What's more, it has the plant capacity to produce far more fertilizer than it now sells. And the nation's farmers certainly would be better off if they were to give their land the plant food it needs.

In one sense the industry has used its plant capacity and productive know-how well. One new product development has chased another. But it is not enough to have adequate supplies of a *workable* product. A product must not only be good. It must be *salable.* The basic problem is no longer how to produce plant food for many varied uses. *The basic problem today is how to build markets with consumer demand created by selling the built-in user benefits of the product.*

WASTED MARKETING EFFORT

Many will say that this has been done and is being done. Is it being done with enough understanding of what will motivate the buyer? The record bears out that it is not. For example, the widely publicized National Plant Food Institute survey (March, 1958 FARM CHEMICALS, page 14) conducted by National Analysts, Inc., one of the nation's top marketing and economic research organizations, produced the information that only 6 per cent of all farmers are interested in a brand of fertilizer; and only 9 per cent are primarily interested in "expected results" or benefits.

Considering that among all major agricultural commodities used by growers, fertilizer has been longer and more aggressively advertised than any other commodity, this is a shocking result—a result proving that much of the industry's marketing effort has

marketing

simply been wasted. A total of 60 per cent of the farmers responding to the survey rated "analysis, amount and price" first in point of interest. But these are factors which, had a good brand merchandising job been done, should be associated with preference for a specific brand. Here is evidence that fertilizer manufacturers and mixers have done a poor marketing job.

For an industry that excels in product research and development to do so poor a marketing job doesn't make sense. What manufacturers and mixers have to learn, as did the company searching for a merchandising manager, is that *it is more important to own a market than to own a mill.* Who creates markets? People. What kind of people?

Something Dr. John G. McLean, vice president for coordinating and planning of Continental Oil Company wrote in the July 1958 issue of *The Journal of Marketing* applies here. He called it "A Problem in Eugenics."

"We must do some crossbreeding in our marketing organizations," he said. "The handling of the responsibilities in marketing management clearly calls for a diversity of human talents. We need men who have the personality traits and human characteristics which will enable them to do an effective job in dealing with customers and the public. We need artistic and imaginative people to create effective advertising and sales programs and to develop new ideas with regard to distribution methods. And we need men with strong analytical abilities to cope with the strategic and logistic aspects of marketing operations."

What must these men do? A sound way to answer this question is in terms of five basic marketing principles that have been set forth by David F. Austin, who retired the last day of 1956 as executive vice president, commercial, U. S. Steel Corp., after 39 years in sales. (He often used the expression, "It is much more important for a business to own a market than a mill.") There is no manufacturer in the fertilizer industry who couldn't benefit from putting these five principles—all of them—to work. Executives know that a plant for producing a quality product, in adequate quantities, at lowest possible cost is a tangible asset—an integrated composition of machinery, materials, men and their methods.

THE MARKET AND MUTUAL CONFIDENCE

A market is quite a different thing. It is a non-integrated collection of potential buyers whose common interests must be integrated—in order to be able to inject, in the words of Austin, the "priceless ingredient of mutual confidence, based on faith in the product, the manufacturer who made it, and those who sell and service it, on the one side—and the ability to pay for the product in accordance with the terms of sale, on the other."

Earn this confidence and *you will own your market.* Do not earn it, and the momentum on which any successful marketing effort has to sail forward, will drag and fade out in the end.

As demonstrated, you do not get to own your market by merely producing a workable product without also making it salable—and salable does *not* mean selling it cheaper. Price, a lower and still lower price has been a big sales weapon for fertilizers, although anyone should know that the "still lower price" is a boomerang, and does exactly what a boomerang does. It hits you back. But practice Austin's *five basic marketing principles,* and you will keep on sailing forward on a surging momentum that will generate its own power. *Here are these principles.*

ONLY A FULLY INTEGRATED MARKETING PROGRAM CAN ACHIEVE MAXIMUM SUCCESS

Integrated marketing means simply to do *all* things that convincingly demonstrate product benefits in such a way that each effort supplements all other efforts. For a fertilizer manufacturer it means the integration of advertising in all media—including the farm paper and magazine, trade magazine, newspaper and farm radio or television program. It means distribution of educational and sales literature. It means the creation of what is called a "good press"—articles and reports on the agronomic background, the research and development behind the branded fertilizer product. It means attractively designed store displays and packaging. It means integrating the training of sales and other personnel with the training

The author, Erwin H. Klaus, is a marketing executive of the J. B. Hill Co. division of Balfour, Guthrie & Co., Ltd., Fresno, California. He has served as marketing director of Northrup, King & Co. and as general manager of Ravel Bros., Inc. He is a member of the American Marketing Association, the National Sales Executives and the Sales Leadership Panel of Sales Management *magazine.*

of dealers and their sales people—and bringing this integrated marketing effort to the buyer in terms of individual selling effort, farmer meetings, demonstrations and state or county fair exhibits. When all men who sell the branded product talk the same language that is in your advertising and promotion, you will deliver the message more often and at less cost for each delivery.

ONLY THE RIGHT PRICE IS A FAIR PRICE —FAIR TO SELLER AND BUYER ALIKE

Here's a sore spot. Pricing methods—one can hardly call them "policies"—have become increasingly chaotic. One manufacturer falls over the next in offering a lower price or fancier credit terms. Too frequently, farmers have learned to ask *not* "what results can I expect?", but "what credit terms can I get?". How did this problem become so serious? Partly because neither manufacturers nor their dealers have had the salesman's courage to ask a fair price. And what is a fair price?

To the seller it is one which permits him to recover his costs, plus an equitable profit, when using competitive facilities. If his profit doesn't permit him to reinvest in research and product development and in the marketing of the product to create acceptance for it, he cannot continue to deliver product benefits to the buyer.

To the buyer a fair price means getting a benefit that he can see, with the promise that at some future time he will get an even greater benefit because the seller has reinvested part of his profit to *produce* that still greater benefit. A fair price should also mean freedom from discrimination. The buyer should be able to buy at the same price under the same terms as every other buyer under like conditions—with special privilege for none. Certainly this, in some quarters, will be considered controversial. Still, the principle stands, and practicing it will help your business.

The seed industry furnishes an example that proves the point. A few years ago it suffered from the same demoralized pricing methods that afflict the fertilizer industry. One seed company—Northrup, King & Co.—swam straight upstream, created branded products, built an integrated marketing program around them that resulted in a high degree of buyer acceptance, fought vigorously for maintaining a "fair price" level, succeeded in doing so, and has for some years now reaped the harvest of its tough-minded policies.

THERE IS NO SUCH THING AS A ONE-TIME BUYER

Any marketing objective must seek not only to make a sale, but also to create customers—the sum of whom will build a market. Axiomatic as this seems, fertilizer manufacturers' pricing and credit methods are working toward just making a sale, unless the buyer is in for so much credit that he cannot get away. When people know they can get a still better deal from someone else, they'll of course shop for that better deal, forgetting that the "better" in the deal more likely than not is illusory. Sure, some fertilizer manufacturers now blame farmers for having depressed the price level, which is no better an excuse than that of the child who didn't come straight home from school because the other kids didn't either. To "own your market" you must build a continuing customer relationship. And this strong customer link must be clearly understood, sincerely believed in and actively pursued at *every level* of your organization.

THE SELLER'S RESPONSIBILITY IS DISCHARGED ONLY WHEN THE PRODUCT HAS SERVED THE USER SATISFACTORILY

As Austin has said, "There is nothing economically sound or ethically right in a concept which passes responsibility for the performance of the product on down through the distribution chain"—without providing for the control necessary to insure standard performance. Fertilizer manufacturers have often done a superior job of satisfying customers—considering the difficulties that arise with varying conditions of soil and soil use. Application of this principle involves the product *and* a standard of performance. Advertising, sales promotion and selling presentations sell a standard of performance as well as the product itself. There can be no excuse for the failure of an individual unit to meet the standard that has been created in the buyer's mind. "If the particular product supplied does not support the standard," Austin says, "it must be made to do so, or be replaced willingly by one which does."

Your entire organization—not marketing alone, but also finance, research, engineering and production—must accept this principle; otherwise it cannot be made to work.

SALES EFFORT MUST BE APPLIED ALONG THE ENTIRE DISTRIBUTION CHAIN

Integration of a marketing program is completed only when it permeates through the entire distribution pipeline so that each entering product unit moves out as rapidly as possible. While the unit stays in the pipeline, costs keep piling up. Often these costs don't show up on the ledger, but they are there. And the elements that contribute toward fast movement through the pipeline frequently are not visible to the naked eye. *Sound customer knowledge*, may the customer be a dealer or a farmer, is a large factor. It in turn depends much on the quality of your sales training. The more favorable impressions you can create about your products, your company and your people, the more help you will get from others in speeding up the pipeline movement. Only integration of *all* efforts that build acceptance and carry the product to market will produce the speediest pipeline movement possible.

Certainly, these are broad concepts. But the fertilizer industry is getting into a spot that is aptly described by the warning: Let the *seller* beware. Scientists and engineers in agriculture and the fertilizer industry have already helped to produce a new concept of agriculture. They will be ill rewarded if the products that their skills continue to produce are not *marketed* with the skill that will best fill the needs of farmers and the industry. ▲

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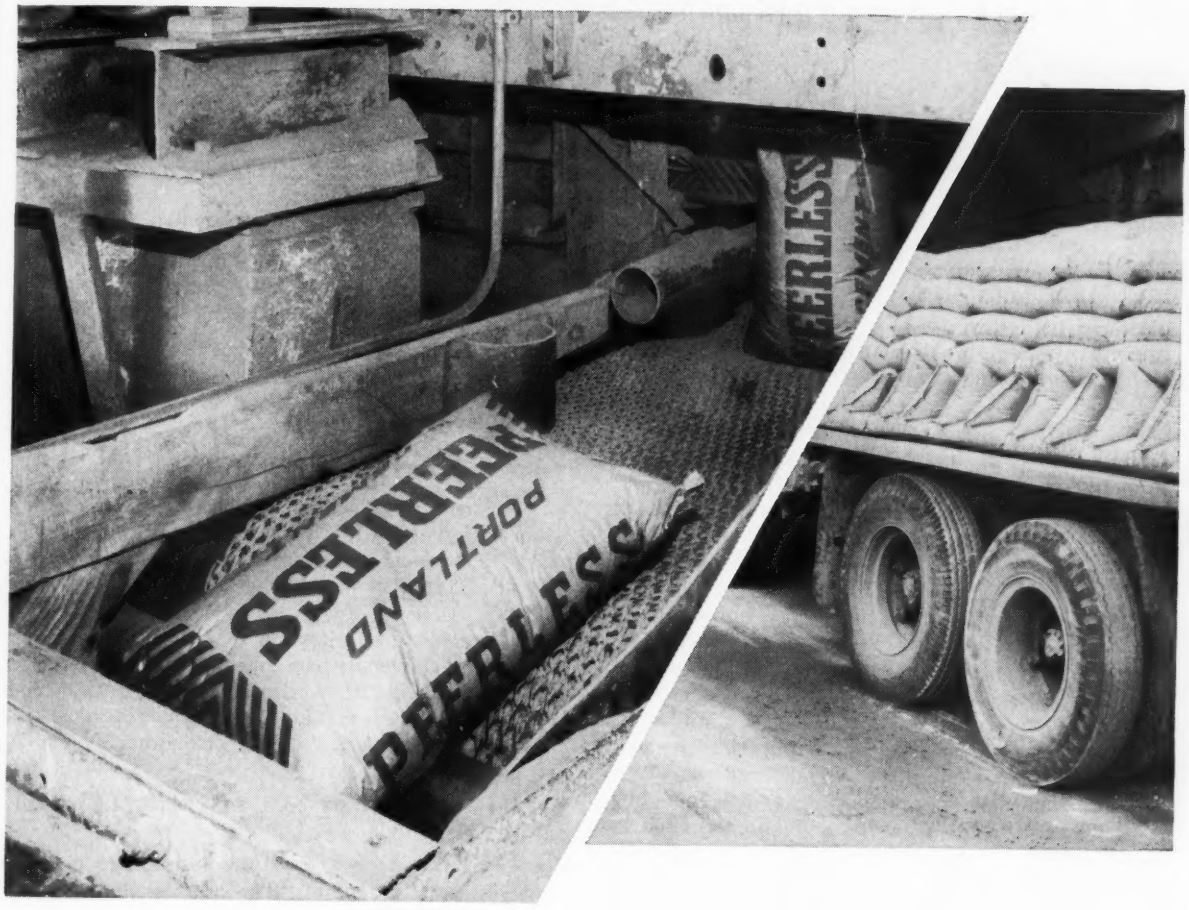

WONDERWALL is West Virginia's new multiwall bag. It's tougher because it's made from Clupak* kraft paper that stretches.

Mr. W. T. Wyman, Purchasing Director of the Peerless Cement Co., a Division of American Cement Corp., at Detroit, says:

"We checked the WONDERWALL for breakage in every step of our production—from the line to the dealer's warehouses. We were pleased to find that we were getting a reduction in breakage of about 80%, and we used about 600,000 WONDERWALLS in our operation in 1958.

"Our experience indicates that the strength of the WONDERWALL is such that with one ply less than standard kraft, it still is stronger."

Whether you pack fertilizer, feed, chemicals, sugar, or any other material, your product will travel safer in a WONDERWALL. Besides reducing breakage, the WONDERWALL packs faster, handles easier, and stacks firmly.

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Try this superior new multiwall . . . *you have so much to gain.* Order a trial shipment of 5000 WONDERWALLS on your next carload. Write Multiwall Bag Division, West Virginia Pulp and Paper Company, 230 Park Avenue, New York 17, N. Y.

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**Clupak, Inc.'s trademark for extensible paper manufactured under its authority.*

New NPFI target: your salesman

Success of the first salesmen's school depends on how well fertilizer salesmen can translate the information into something farmers can use

HOW DO YOU "TELL" fertilizer salesmen *how to sell more fertilizer?* Salesmen are rugged individualists —no two sell in quite the same way!" That may have been your reaction when you read in this magazine that the National Plant Food Institute was planning a pilot Fertilizer Salesmen's School in Columbus, Ohio, February 4. Here is a report of that pilot School.

The School drew 180 salesmen, sales managers, market development personnel, and a smattering of company presidents, agronomists, and materials salesmen. About 65 per cent of the total were salesmen—serving dealers and farmers in Ohio.

Russell Coleman, executive vice president of the NPFI, wasted no time in informing the salesmen that he and his "team" had no intentions of telling them how to sell.

"You are practical operating salesmen," he said. "If we all had time, we could find out more about selling fertilizer from you than you can find out from us."

But he promised them some special "ammunition" for their day-to-day selling operation—concerning 1) Knowledge of customers and 2) Knowledge of products—which would help them sell more fertilizer than ever before.

His statements set the climate for the excellent discussions that followed. Each salesman was given a packet of all information to be covered—including A 1959 Guide for Fertilizer Use in Ohio, Soil Production Potential Areas for Ohio and soil test information.

NPFI participants made sure that no one would have to listen to dry lectures. The popular feature that helped get the meeting off to a fast pace—and which gave it a lively "shot in the arm" when speakers came precariously close to displaying verbosity—was a presentation, "Profitable Plant Food Sales" on four filmstrips staged at separate times on the program.

The Customer: A Businessman

Moyle S. Williams, chief agricultural economist of the Institute, described the salesmen's farmer customers as "businessmen who are looking for ways to: 1) increase production, 2) cut costs and 3) increase profits." He said that "our customers have many people competing for their dollars." Examples: suppliers of machinery, insecticides, labor, buildings, and consumption items such as cars, refrigerators, TV.

Williams continued: "Farmers don't want fertilizer —*they want what fertilizer can help them get!*

"Our farmers buy fertilizer *consciously* to reach certain goals," he added. "That involves *thinking.* But they also buy fertilizer *subconsciously. Emotion* plays a part in making the farmer want to reach certain goals."

Most good customers are intelligent businessmen, he continued, yet:

1) Many have little formal schooling,
2) Many rely on someone to try new things first,
3) Many have to "see to believe,"
4) All are experts at raising objections.

He said farmers like to think they make up their own minds, yet *they generally turn to someone for help in making decisions and they can be influenced—but this must be skillfully done.*

Sources of Fertilizer Information

"Farmers rely heavily on personal contacts for information and help. For fertilizer information they turn to 1) local fertilizer dealer, 2) neighbors and friends, 3) county agent, 4) SCS men, 5) family and others.

Williams assured salesmen that Ohio farmers trust Ohio State University as a source of practical fertilizer information, yet "they talk most often to us, which means they need a combination of *college authenticity* and *industry contacts.*" Here are other points he stressed:

▶ Using fertilizer on corn and wheat is "socially acceptable" in Ohio.

▶ Using fertilizer on pasture and forage crops is not yet as acceptable in that state.

▶ Salesmen must build social acceptability for use of fertilizer on *all crops.*

▶ Many low users have little or no contact with

Perhaps the biggest "eye opener" of the meeting was the new *Fertilizer Salesman's Handbook*, published by the National Plant Food Institute.

Designed as a day-to-day working partner of fertilizer salesmen and dealers, it contains information that makes it a hip pocket short course in fertilizer selling. The text and illustrations serve up the kind of help that will be consulted constantly by those who talk with farmers about fertilizer.

Copies are available at $1.50 each, singly or in quantity, postpaid from the Institute. (*See page 12 for more details.*)

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SOHIO CHEMICAL COMPANY

SOHIO's complete line of nitrogen materials gives you the full-range flexibility you need in manufacturing high-analysis finished goods. Choose from a long list of Sohiogen® Solutions, anhydrous and aqua ammonia and Sohigro® Urea to meet your exacting requirements. The "Man from Sohio" will be glad to help you with formulations . . . and explain how you can benefit from Service at Sohio. Call him soon.

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Sohiogen 4424, Sohiogen 4122, Sohiogen 4526, Sohiogen 4730, Sohiogen 4126, Sohiogen 4934 — Old-line and concentrated solutions for both conventional and granulation use

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Sohiogen 2104, Sohiogen 4531, Sohiogen 4537 — Urea and ammonia in 45% nitrogen solutions, winter and summer grades, and high urea content solutions for liquid fertilizer manufacture

Urea — Ammonium Nitrate — Ammonia Solutions

Sohiogen 4119, Sohiogen 4425, Sohiogen 4428, Sohiogen 4933 — Ammonium nitrate nitrogen solutions containing 6 to 15% urea to:
1. lower salting out temperatures of solutions
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3. help condition mixed goods

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Sohiogen 2800, Sohiogen 3200 — 28 and 32% nitrogen solutions containing no free ammonia — ideal for surface and subsurface application — as materials and in complete liquid fertilizers

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official sources of information, such as the county agent.

▶ Most of these customers *must see to believe.* We can reach many through their neighbors who are now our active customers.

He listed these trends in Ohio, which every salesman should take into consideration:

1) *Fewer farms*, hence fewer customers,
2) *Larger farms*, hence more consumption per customer,
3) *More specialization*, hence more special problems,
4) *Better educated customers*, hence more and better questions,
5) *Customers demand more service*, hence take more time per sale,
6) *More competition*, hence more effort required.

Like Running a Race

Following this talk came the first of the film strips on "Profitable Plant Food Sales," introducing the "*Four Steps to Making Sales.*"

Attempting to sell a farmer fertilizer was likened to running a race: 1) Getting to the quarter pole, 2) Getting to the half-mile pole, 3) Getting to the three-quarter mile pole, 4) The home stretch.

Buying motives of farmers were listed as profits, pride, convenience, and taking the risk out of farming.

As for getting to the "first quarter pole" the big thing is to *convince 'em right at the beginning that you're there to show the farmer how he can decrease his cost of production.* That's what he wants to hear—*not that you've come to sell fertilizer.*

Don't set up an immediate barrier by bringing in the price element. *Get the farmer talking about his problem.* He doesn't care about yours!

Ask him what factors he thinks limit his production. "Let the farmer *tell you* about his previous yields . . . what *he* expects he can get . . . and how *he'd* like to decrease his cost of production—before you present him with your "Soil Fertility Plan" for his farm.

How about sales literature—will it distract him? "Definitely not—if you don't have bulletins and other information the farmer will think you don't have any conviction about your own plan," was the answer for salesmen.

"*Carry clean, fresh samples*" was another healthy reminder, "and sell a mental concept of what the farmer can *get* from using your plan."

Gilbert Gust, U. S. Steel Corp.; **Warren Huff,** Ashcraft-Wilkinson Co.; **W. K. Wood,** USS, and **H. H. Tucker,** Sohio.

Next subject on the program was concerned with "Why the Customer Needs Our Product," with Zenas Beers, midwest regional director of the Institute, in charge. He said:

"We must convince Ohio's '70 per cent' who aren't thinking about ways in which they can improve their financial condition *that there's something they can do about their soils, which really have more potential than they realize they have.*" This figure was brought out in an NPFI Study, "Farmers Attitudes Toward the Use of Fertilizer." (March, 1958 FARM CHEMICALS.)

Production Potential Areas Mapped

Ohio State University soils men have divided the state into "Production Potential Areas." A copy of this map was presented to each salesman.

The NPFI, Beers said, computed by areas the 1954 yields per acre of corn based on U. S. Census data, and adjusted these to the 10-year average yield. Then it came up with *minimum* yield goals for the best and poorest soils in the area, except for those areas where one soil type makes up most of the area.

Raoul Allstetter, NPFI vice president and director of regional activities, and Moyle Williams teamed up to discuss how fertilizer makes the farmer money on all types of crops with *average management and good practices.* All estimates were based on Ohio State University data.

The figures on "Costs and Returns from 120 acres

Zenas Beers, NPFI midwest regional director, and **Russell Coleman,** executive vice president, make final plans.

Walter Eier, Dale Hartranft and **James Eier,** The Ohio Farmers Grain & Supply Association, with **Vernon E. Pinkerton** and **Richard Krietemeyer,** Armour Fertilizer Works.

Farm Chemicals Photos

Baugh and Sons Co., Inc., of Ohio salesmen (l to r): **Doyle Chesrown, Robert Ardner, Les Swab,** whose face is hidden by that of **Ted Black, Wayne Walton** and **Ralph S. Halliwill.**

in Ohio," for instance, with corn—wheat—hay rotation went like this:

120 ACRES	LOW FERTILIZATION	HIGH FERTILIZATION
40 acres **corn**	$ 0	$1080
40 acres **wheat**	0	440
40 acres **meadow hay**	− 120	520
	−$120	$2040

Farmers producing under low fertility conditions are just about breaking even. Those who have a good fertilization program are making profits on all crops in the rotation, it was pointed out.

John R. Guttay, an NPFI midwest field representative, discussed why a farmer's crops must have balanced plant food, bringing out the advantages of using mixed fertilizer in correcting soil deficiencies or nutrient unbalance.

"Steps 2 and 3" of the film strips on how to sell plant food emphasized 1) enthusiasm, 2) keeping on the right track, and 3) *getting agreement on main points as you go along.*

"*Soil tests* are a good sales tool for increasing fertilizer sales," Werner L. Nelson, American Potash Institute, told salesmen. "*If you have sold soil tests, the chances are you have sold the fertilizer.*" He listed eight reasons why soil tests help the industry.

1) *Grower* feels dealer is sincere.
2) Grower uses the fertilizer dollar more efficiently.
3) Grower uses more fertilizer.
4) Grower understands fertilization program better.
5) They're a *concrete thing* to discuss with grower.
6) They bring in new customers.
7) Grower is a satisfied customer, will be back next year.
8) Grower has more money to spend, can buy more of what dealer sells.

Fertilizer Recommendations are another sales tool for salesmen. John R. Guttay explained how to use Ohio State University data in order to be of utmost service to farmers.

Demonstrations came in for thorough discussion by Arlan Woltemath, a midwest field representative for the NPFI. He pointed out that some salesmen may be in a position to influence and assist the local agricultural authorities who are putting on demonstrations—"or you may want to put out demonstrations of your own."

Production potentials by crops by areas were emphasized as effective selling tools by Zenas Beers. He reminded salesmen that "some Brookston soils are better than other Brookston soils." You can figure on about a 5 per cent variation, he added. To bring out the best in soils, you've got to realize that some management practices are as important as fertilizer, he said, and singled out liming as most important of these. As for drainage, he said: "If you don't get farmers to drain their soils, fertilizer won't give the kind of crop response it should."

"Production potentials are a tool to help raise the sights of farmers," he concluded, "to convince them that they can and should do better."

On the 'Home Stretch'

The final filmstrip on selling plant food emphasized that salesmen should "start to *close* when they *start to sell.* "A good salesman is always closing a sales opportunity." When salesmen start on the "home stretch" it was suggested that they:

1) Throw out "Closing feelers."
2) Watch for "closing signals" on the part of the customer.
3) Make it easy for customer to say "Yes." Give him a choice of two positive actions: "Well, should we send out the *full requirement* now—*or* the first increment today, followed by additional increments as you need them?"

As for the order blank, salesmen were reminded:

"Don't thrust it out suddenly to close the sale. Have it out where he can get acquainted with it gradually."

4) Know when to shut up! ▲

Allied Chemical Corp.'s **G. C. Matthiesen** and **Ed Copp,** with **Jim Stone,** V-C Chemical Corp.

Joe F. Stough, U. S. Potash Co., studies guide for Ohio fertilizer use.

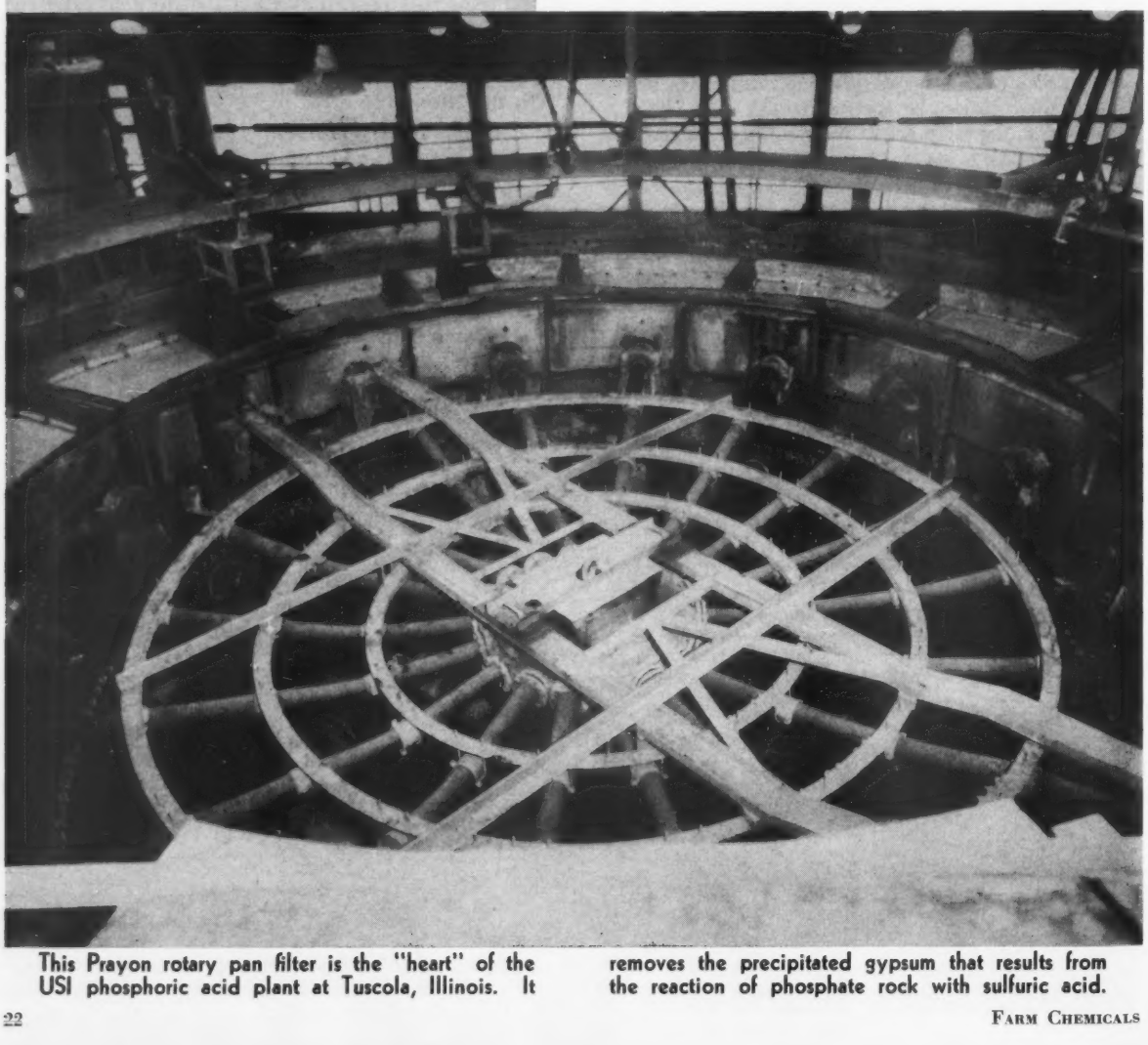
Farm Chemicals Photos

Participating NPFI staff members included **Arlan Woltemath, Raoul Allstetter, Zenas Beers, Russell Coleman, Moyle S. Williams and John Guttay.**

The future of PHOSPHATIC FERTILIZERS

Phosphoric acid, when sold and shipped for use in the manufacture of fertilizer, moves under a rail classification of "Phosphatic Fertilizer Solution." This classification covers the normal commercial strengths of acid, regardless of means of manufacture. Because of the use of the railroad terminology on bills of lading and invoices, the longer name has become common in industry. Actually, under the regulations of the Interstate Commerce Commission, it is improper to offer, or to sell, phosphoric acid, and then ship it under another name to obtain lower rates. In this article, we shall refer to the material as "Phosphatic Fertilizer Solution," or PFS.

AS IS THE CASE with most products, either new or intended for new uses, PFS has suffered from a wide range of supposedly expert, but actually ill-informed opinion. The use of PFS in the manufacture of mixed fertilizer has been hailed as a cure-all—which it assuredly is not—and has been damned as just a more complicated and more expensive way of providing P_2O_5, which is equally untrue. It is the purpose of this article to present a balanced view of the material and its uses, based on experience in many types of fertilizer plants in a variety of locations. *The widest use of PFS to date has been in the Midwest,*



This Prayon rotary pan filter is the "heart" of the USI phosphoric acid plant at Tuscola, Illinois. It removes the precipitated gypsum that results from the reaction of phosphate rock with sulfuric acid.

By LAWRENCE C. BYCK, JR.

R SOLUTION

and the results there are not to be applied uncritically to other areas.

As a background to the discussion, let us look briefly at some history. Phosphoric acid itself is an old and well established industrial chemical. It is made by either of two processes, referred to as "furnace" (or "pyrolytic") and as "wet process." The furnace process produpces a highly ure acid, which is suitable for several very critical uses in foodstuffs and in animal feeds, as well as in detergent manufacture. Historically, its price structure and variable availability have made it of only limited interest to the solid fertilizer industry.

Wet process phosphoric acid, the less-pure variety, is not by any means a new product either. Its manufacture is an essential step in making triple superphosphate, and it has been produced in enormous quantity for this purpose for many years. In addition, several chemical processes directed to other final products give rise to quantities of impure by-product phosphoric acid. A few fertilizer companies have produced wet-process acid for captive use at the point of manufacture, and small portions of this captive production have been marketed from time to time.

PFS IS YOUNG AS A RAW MATERIAL

However, the emergence of PFS as a standard, full-fledged raw material for the fertilizer industry generally dates back only to January, 1957, when the wet-process plant of U. S. Industrial Chemicals Co. at Tuscola, Illinois, came on stream. This plant was designed and built solely for the purpose of marketing PFS to the fertilizer industry, as it serves no captive use. Several other sources of PFS have been announced since then, and the material may now be purchased from plants in Florida (points of triple superphosphate production), in Texas (manufacture of dicalcium phosphate feeds), in Oklahoma (manufacture of ammonium phosphate fertilizers) and elsewhere.

The method of manufacture of wet-process phosphoric acid (or PFS) has been described in detail earlier. (*1*) (*2*) Suffice it to say here that phosphate rock is digested with sulfuric acid, and the resulting gypsum or calcium sulfate filtered off.

The photograph shows a top view of one type of filter used to remove the precipitated gypsum. It is the Prayon rotary pan filter in the USI plant at Tuscola, Illinois. Around the outer periphery may be seen the individual filter segments, each with its cloth and vacuum line. Distribution boxes for slurry and for wash water are at upper left. Filtered acid is removed underneath. The clear weak acid is then concentrated to its market strength. This strength is generally in the range of 52–54% P_2O_5, or slightly below 75% H_3PO_4.

PHYSICAL AND CHEMICAL PROPERTIES

Commercial PFS is a greenish, viscous liquid, having no clearly-defined freezing point, and boiling at a temperature of about 285° F (*3*). Its viscosity increases sharply with concentration, and with decreasing temperature. Like most acids, it is corrosive to most metals and to human tissues. The acid itself has little odor, although when heated, the presence of its characteristic impurities may give some odor. It is soluble with water in all proportions.

Chemically, commercial PFS is a mixture of a number of substances. It contains P_2O_5, partly as the ortho phosphoric acid, H_3PO_4, and partly as iron and aluminum phosphates. The total P_2O_5 content is normally in available form. Some 15–20% water is present, and usually a small percentage of excess sulfuric acid. Most of the impurities found in the original phosphate rock will be present, although many only in trace amounts. Among these may be listed fluorine, silica, manganese, vanadium, magnesium, lead, copper and zinc.

The foregoing facts alone do not explain the usefulness of PFS to the fertilizer industry. *From the viewpoint of this industry, what is the material?*

1. It is the only commercial source of P_2O_5 in

Lawrence C. Byck, Jr., is Manager of Heavy Chemical Sales for U. S. Industrial Chemicals Co., Division of National Distillers and Chemical Corporation. Since joining USI in 1945, he has served in the Research and Development Department, the Office of Chemical Technical Development, in technical liaison, and as assistant to the manager of chemical sales.

In his present position, he is responsible for sales of USI's heavy chemicals, principally to the fertilizer industry, and was responsible for the introduction of wet-process phosphoric acid (PFS) as a fertilizer material in the Midwest. Other products in the heavy chemicals group include sulfuric acid, ammonia, fertilizer nitrogen solutions and nitric acid.

He received his Bachelor of Engineering degree in chemical engineering from Yale University in 1940, and has taken advanced courses at Columbia and Johns Hopkins Universities. He is a member of the American Institute of Chemical Engineers, the American Chemical Society, and the Yale Engineering Association.

liquid form. This means that its use eliminates dusting nuisance and losses, and avoids a massive solids handling problem.

2. It is by far the most highly acid source of P_2O_5 commercially available.

3 It is the most concentrated commercial source of P_2O_5, being nearly 18% higher in P_2O_5 content than triple.

4. It may or may not be a markedly economical source of P_2O_5, taking all factors into account; this depends on the consumer's location.

Given these considerations, we are ready to answer the all-important question: What will PFS do *for the mixed goods industry?*

▶ First and foremost, of course, it is a carrier of needed P_2O_5 in the formulation. It adds some water—often needed for proper granulation. Some of its phosphate is in the form of the iron and aluminum phosphates, available as plant food. Some experimental work seems to indicate that the iron and aluminum salts themselves are aids to granulation.

▶ PFS is a source of trace elements, just as is phosphate rock itself. These may or may not be of value to a given crop in a particular area, but they are free! A small quantity of sulfur, as sulfuric acid, is also present in wet-process PFS.

▶ The acidity of PFS neutralizes large quantities of ammonia. Practical ammoniation rates of up to 7 pounds per unit P_2O_5 may be expected—far more than with other forms of phosphates. This factor has, of course, an important bearing on overall formulation costs and is one of the great advantages in use of PFS.

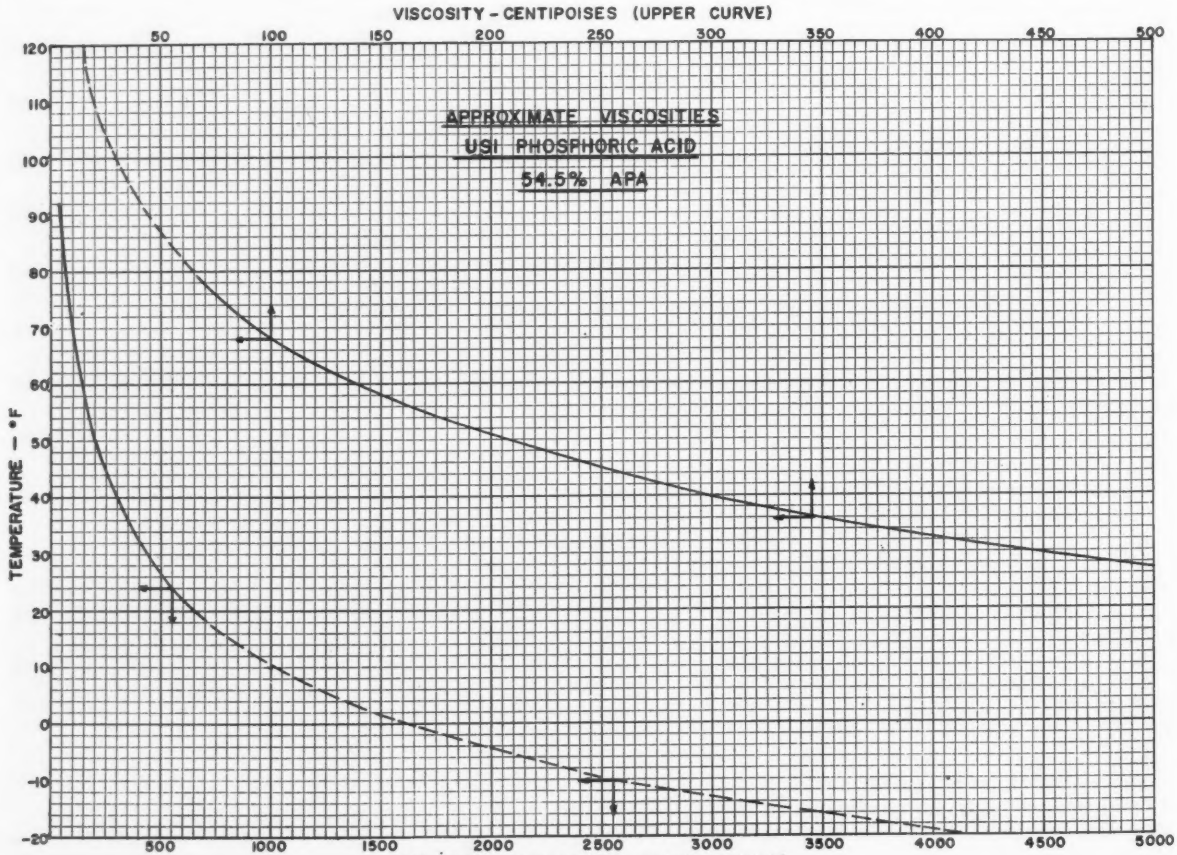
▶ In granulation processes, formulations using PFS are generally found to produce more rugged granules, better suited to subsequent handling. And this is done without use of granulation aids such as sulfuric acid, which represent an expense for non-plant food ingredients!

▶ The higher concentration of P_2O_5 allows formulation of grades of higher analysis than can be achieved with older forms of phosphate. Where the trend to highly concentrated plant foods is most developed, this fact nearly dictates the use of PFS.

▶ Finally, experience shows that in many granulation plants, the use of PFS in the ammoniator eliminates the nuisance and loss of ammonium chloride fumes, and also eliminates the danger of flash fires due to overheating ammonium nitrate.

SOME POINTERS ON HANDLING PFS

All of these advantages to the fertilizer manufacturer may best be gained only if proper attention is paid to the unique handling requirements of phosphoric acid. Transport is normally in rubber-lined



Commercial Phosphatic Fertilizer Solution has no clearly-defined freezing point, and boils at about 285° F. Its viscosity increases sharply with concentration, and with decreasing temperature.

tank cars or stainless steel tank trucks. In-plant storage may be rubber-lined steel, brick-lined steel or rubber. A few examples of use of steel tanks with loose plastic bag liners are known, but these are relatively new installations, and their life expectancy is not yet known.

For piping, rubber hose may be used, or piping of stainless steel, rubber-lined steel, or certain plastics. Carbon steel is subject to rapid destructive attack, and is *not* recommended.

Because PFS is ordinarily dark greenish in color, metering by ordinary rotameters is not satisfactory. The armored types of rotameters, in which the indicating device is external to the metered fluid, are being used. Most satisfactory of all for accuracy is a magnetic-type flowmeter, rather recently developed, and offered by two instrument manufacturers.

The safety precautions required are those common to the handling of other strong acid materials, and include safety goggles, gloves, and so on. PFS is not as quick-burning to personnel as is sulfuric acid. Like sulfuric, it does not ordinarily present an inhalation hazard, nor is it volatile nor flammable.

To summarize, reasonable attention paid to the requirements for satisfactory handling of PFS at the start will assure that its use in fertilizer plants will not prove difficult. Like any chemical, it must be handled with respect.

WHAT, THEN, OF THE FUTURE?

We come to the most important facet of all. *What part will PFS play in the production of tomorrow's fertilizer?* The fertilizer manufacturer clearly cannot afford to go overboard for a specialized material that proves to be a flash in the pan. Equally clearly, however. he can hardly afford to be the last in his area to reap unique advantages in product quality and formulation cost that are obtainable by use of a new raw material.

As he looks ahead, the manufacturer can see two definite and well-established trends. Granular goods are increasing in popularity, and the demand for higher and higher analysis goods is also increasing. These trends, while far more advanced in some sections of the country than in others, certainly seem destined to continue in all sections.

With these things in mind, it is safe to say that PFS is *not* just another source of P_2O_5. As we have seen, it has unique and clear-cut advantages to offer, and these have proven sufficient to overcome the problems of handling, re-formulating and re-equipping for dozens of plants over a very wide area. Many companies and individuals have demonstrated to their own satisfaction that the claimed advantages in use of PFS are real and not illusory; formulation savings and improved product quality are a final answer.

CONSIDER LOCAL FACTORS

On the other hand, it must not be assumed that PFS will be the only major source ot P_2O_5 in the future. The facts that relative economics, crops and soils, and grade requirements will vary with plant location mean that local costs and local manufacturing abilities will dictate choice of materials. The advent of PFS does mean an additional possibility for every formulator to consider.

Where, for example, an existing normal superphosphate installation provides that material for formulation at a cost of 80¢ or 90¢ a unit, it is obviously wise to use normal for any grade low enough to have room for it. As P_2O_5 content in the product must be increased, the use of PFS with its high concentration allows use of the maximum quantity of normal superphosphate.

In other locations, normal super must be shipped in, and often delivers at a cost per unit in excess of that for triple super. Here the need for PFS becomes apparent mainly as the grades to be manufactured approach or exceed the maximum P_2O_5 content obtainable with triple.

If the tendency toward extremely high analysis goes as far as some are predicting, grade requirements alone may dictate the use of PFS *with* 45% triple, 54% triple, or even newer materials. This situation does not yet generally exist, and it is not at all likely to occur with great rapidity in the areas where the use of fertilizer is large, old and well-established.

NOT FOR MATERIAL PRICE ALONE

From the standpoint of economics, PFS is unlikely to be the cheapest source—on a unit basis—of P_2O_5 at any location. Overall savings, and not merely savings in direct cost of phosphate, must justify its use where it is to be used at all. Because of the unavoidable effects of costs of transportation, it seems probable that in the future PFS will remain, in many places, economically impossible to justify.

But in many locations—in many of the important agricultural areas—it should be the product of choice for the reasons of product quality, overall costs and adaptability to process needs.

Where this is the case, the fertilizer industry may rest assured that the capacity for manufacture of PFS is ample for any foreseeable need, and that stability of supply need cause no concern. ▲

Acknowledgments

It is impossible to list the names of all those whose help and cooperation should be recognized here. Frank discussions with, and open sharing of experience by, members of the fertilizer industry have been deeply appreciated. In contributing to the understanding of phosphoric acid in the industry, Messrs. K. D. Jacob of the U.S. Department of Agriculture and T. P. Hignett of the Tennessee Valley Authority deserve especial mention. The author's thanks for invaluable assistance are tendered also to Messrs. R. M. Magness, T. E. Martin, and E. D. Biggers of U.S. Industrial Chemicals Co.

References

(1) Jacob, K. D., et al, "Fertilizer Technology and Resources," Vol. III of *Agronomy Monographs*. 1953. Academic Press, Inc., New York.

(2) Waggaman, W. H., "Phosphoric Acid, Phosphates, and Phosphatic Fertilizers." 1952. Reinhold Publishing Co., New York.

(3) Striplin, M. M., Tennessee Valley Authority Chem. Eng. Report 2. 1948.

Part 2: A Special Report

New Farm Chemicals

Experimental and commercial compounds for weed and insect control

Fenac Pre-Emergence Herbicide

Discovered by Hooker Chemical Corp. researchers, Fenac (2, 3, 6-trichlorophenyl acetic acid) is being developed cooperatively by Hooker and Amchem Products, Inc. It "is very promising" for pre-emergence crabgrass control in established turf, for quackgrass and bindweed control, for pre-emergence control of annual grasses and broadleaf weeds in corn and for soil sterilization.

Although Fenac appears to be considerably more effective in eradicating bindweed than polychlorobenzoic acid or 2, 3, 6-trichlorobenzoic acid, its action is "considerably slower," Amchem said. Preliminary tests indicate that fall applications of 5 to 10 pounds of Fenac an acre can prevent bindweed emergence the following spring, while spring applications of as much as 20 pounds an acre have sometimes failed to give complete eradication by fall.

Falone Shows Selectivity

A pre-emergence herbicide, Naugatuck Chemical Division's Falone has as its active ingredient tris-(2, 4-dichlorophenoxyethyl) phosphite. It has "indicated a pattern of selectivity and promise" on several crops, including peanuts, strawberries, sweet potatoes, white potatoes (layby), nursery, turf (specifically crabgrass control), corn and asparagus.

Two formulations of Falone are available in limited quantities to qualified research personnel—Falone-25E, prepared as a two-pound active gallon with the emulsifying agent included, and Falone 5-G, prepared on a 30–60 mesh granule containing five per cent active ingredient.

Phosphamidon Insecticide

Among the pests that are controlled by California Spray-Chemical Corp.'s Phosphamidon are mites, aphids and some beetles. A systemic, the product is 2-chloro-2-diethylcarbomyl-1-methylvinyl dimethyl phosphate.

Sucking and chewing insects have been controlled by the compound. Generally, its effectiveness is shown one to three days after application.

Limited amounts of Phosphamidon 4 Spray (4 pound per gallon formulation) will be available this year for experimental use.

Dow's Systemic and Aquatic Herbicides

Garlon, a Dow Chemical Co. product, is reported to control most broadleaved weeds and grasses systemically. It contains 4 pounds per gallon of dalapon acid equivalent as a low volatile ester and silvex at ½ pound per gallon acid equivalent as a low volatile ester. Dow recommends application early in the growing season, followed by spot treating if new seedlings and some regrowth occur.

Dow's Kuron "has shown considerable promise for control of submerged and emergent aquatic weeds in several locations." A growth regulator which is absorbed by the leaf and translocated to the other parts of the plant, Kuron contains silvex (2 (2, 4, 5-trichlorophenoxy) propionic acid) as the propylene glycol butyl ether ester. Observations of experiments by the New Jersey Division of Fish and Game suggest that Kuron acts slowly—reducing the possibility of oxygen reduction with accompanying fishkills as well as reducing objectionable algae blooms.

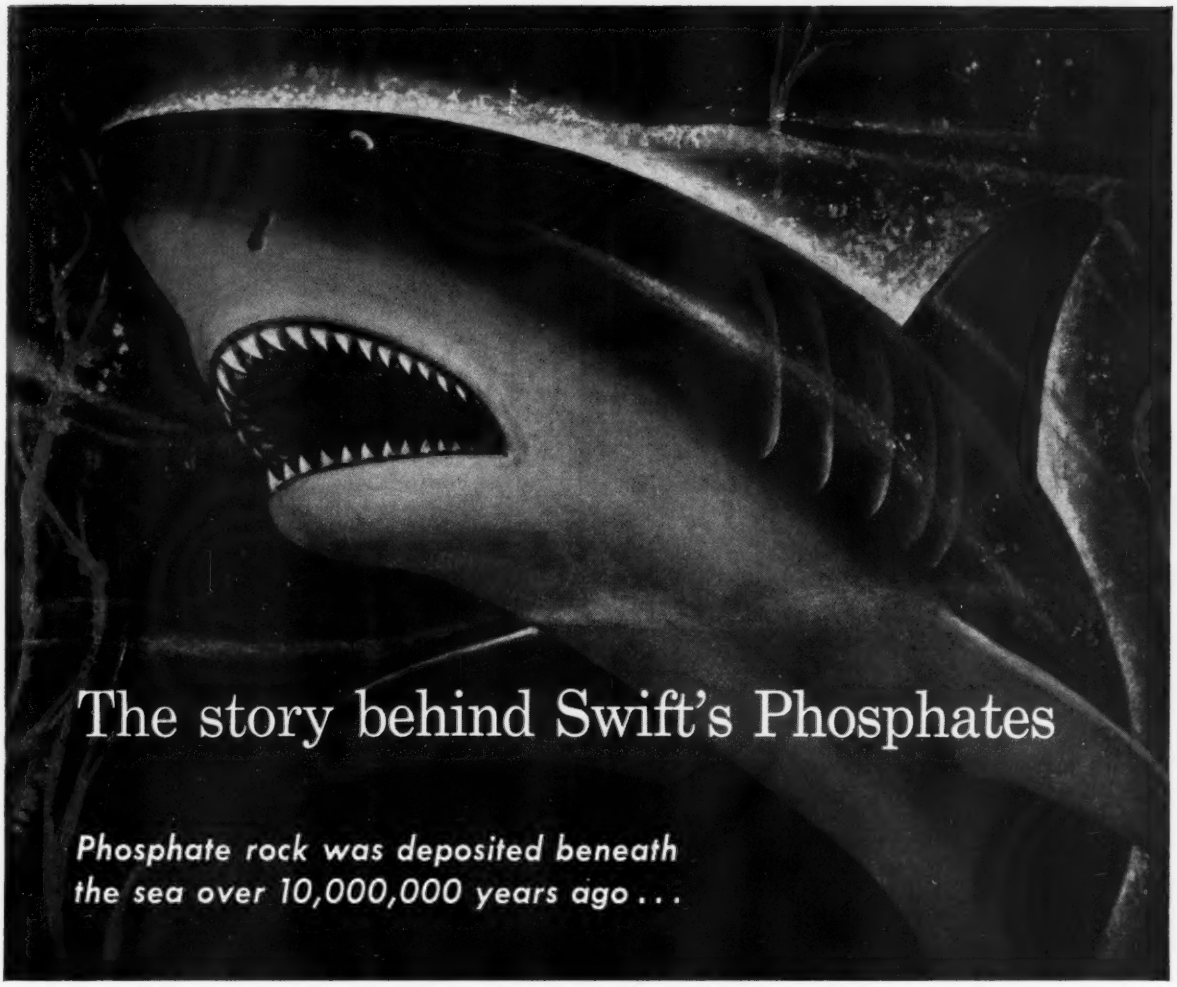
Granular Randox, Simazin

Preliminary tests at the University of Minnesota last summer showed that randox and simazin in granular form can give good weed control in corn. L. A. Liljedahl, USDA engineer, conducted the tests. Spray and granular forms of the two chemicals were compared in pre-emergence band applications—a band 14 inches wide over the row, just after planting. The applicator, mounted on the planter in each case, applied randox at 4 pounds and simazin at 2 pounds an acre. At summer's end, there were 92 pounds of weeds per acre where the spray was used and 250 where granules were applied. Either is reported to be good control.

Dr. L. L. Danielson of USDA's Agricultural Research Service conducted research with simazin pre-emergence spray at Beltsville, Md., during the past two growing seasons. He reports it offers excellent control of annual grasses and broadleaved weeds in sweet corn without adversely affecting yield, quality, palatability or maturity date of the corn. Simazin was evaluated at 2, 4 and 8 pounds per acre. Best results were obtained with the 4 pound application.

Dinoben and Amoben

Dinoben and Amoben will be available from Amchem Products, Inc. to research workers this year. Dinoben, a nitrobenzoic acid, and Amoben, a pure form of Dinoben, show promise as selective herbicides on some crops, Amchem reports. In tests during 1958, Amoben gave better weed control and was safer to use than Dinoben as a pre-emergence spray on soybeans. Used on seeded vegetable crops such as tomatoes, peppers, cabbage, cauliflower, broccoli, celery and potatoes, both materials give "good control of annual grasses and weeds, but some injury has been observed on some species at a 4 pound per acre rate pre-emergence." However, when applied in granular form after crop emergence or transplanting but before weed emergence, the compounds gave "excellent" control with no injury to the crop. ▲



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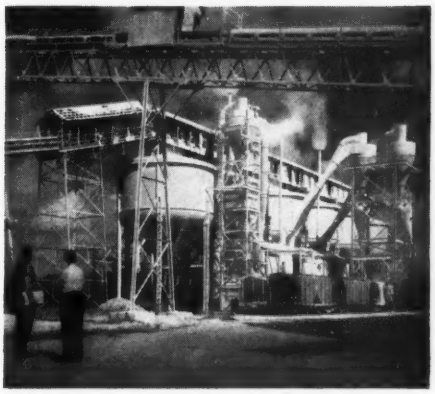

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TECHNICAL REVIEW

To control a specific disease and/or for use in a specific host, the considerations of cost, climate, consumer safety, fungitoxicity and phytotoxicity take part in shaping the trend—in development and application—toward

SPECIFIC FUNGICIDES

By J. D. WILSON

USE OF A SPECIFIC FUNGICIDE to control a specific disease, or for use on a specific host, or both, has come about for several reasons. The most important of these, perhaps, has been the desire to avoid the phytotoxic effects of certain fungicides on specific hosts, although those in use may have been satisfactorily capable of controlling the disease against which they were being used. Other factors would include such considerations as cost; effect of climatic peculiarities on performance; lack of fungitoxicity, adhesion, or chemical stability; safety to the user, consumer; etc.

The phytotoxic effect of Bordeaux mixture, one of the most universally effective fungicides yet developed for use on many plants, especially on many of the fruits on which it otherwise might have been used, was one of the primary reasons why lime-sulfur was substituted for it after the latter became available around the turn of the century. Further substitutions were few until about 1930 when the fixed coppers entered the picture for use on such Bordeaux-sensitive vegetables as cucumbers, tomatoes, etc. Neither was lime-sulfur without fault on many species of fruits, and it was gradually relegated to use only as a dormant spray by the gradual substitution of flotation sulfur paste. Later that was in turn largely replaced by the present-day finely ground wettable-sulfur formulations. During the past 10 or 15 years the trend toward further specificity among the fruit fungicides has continued apace, until today two or three different compounds are used on apples during the summer spray period to insure the best possible control of all the diseases to which that crop is susceptible.

Another interesting example of specificity of use has to do with the fact that since most of the organic fungicides being used on apples will not control powdery mildew, there has been a return to the use of sulfur in certain spray applications to provide better control of that disease.

Evidence of Climate's Influence

The influence of climate on specificity may be illustrated by calling attention to the fact that various copper compounds may safely be used for the control of certain apple diseases when they occur south of the Ohio River, whereas the same materials are very likely to cause fruit and/or foliage injury when used north of that line. The persistence of Bordeaux mixture as one of the most reliable fungicides for the control of various plant diseases in tropical areas where rainfall is heavy, and where less tenacious and/or stable fungicides have failed, might be quoted as further evidence of the importance of a climatic factor in regulating what fungicide will best do a certain job. A similar set of circumstances may explain why zineb and/or maneb is now more definitely preferred over copper-containing fungicides for the control of late blight of tomato and potato in Florida than is true farther north.

Consumer Safety and Compound Cost

The influence of the factor of safety to the consumer of a given item of produce in determining specificity of use with respect to disease control is illustrated by the restrictions placed on the use of the highly effective mercury-containing fungicides on apples later than 10 days after bloom. This situation is, of course, much more prevalent among the highly toxic insecticides than it is with the majority of fungicides.

Numerous examples of the influence of the cost factor on the choice of fungicides for a specific purpose could be quoted, but perhaps the one involving the failure, because of its high cost, of copper-8-quinolinolate to come into general use as a vegetable fungicide, even though it was very effective in the control of certain diseases, is as good an example as any other.

Variations in Host Response

Specificity within a group of compounds, such as the fixed coppers, is brought about more by variations in host response than by variations in fungitoxicity, since two compounds may be nearly equal in their disease control capability, but may have a quite different effect on the growth of the host plant; and thus in some instances plant safety has taken precedence over a higher degree of fungitoxicity in regulating the choice of a compound to recommend for use on a sensitive host or hosts. An example might be the selection of the tribasic copper sulfates for use on cucumbers rather than the more highly fungitoxic, but also more phytotoxic, cuprous oxides. On the other hand a copper oxychloride might be chosen over a tribasic sulfate for the control of the late blights of potato or celery because of a slightly higher degree of disease control on hosts of comparatively high copper

tolerance. These circumstances of specificity were circumvented by developing a mixture of the two types of compounds, which is now available under the trade name of COC-S, in which the greater plant safety of the tribasic fraction counteracts the tendency toward phytotoxicity of the oxychloride, and the greater fungitoxity of the latter boosts the lesser capability of the former.

Fungitoxicity Often First in Organics

The importance of specificity in the development of disease-control recommendations is also quite evident among the organic fungicides that have been introduced for use on vegetables, but here the impelling factor regulating selection often has been one concerning fungitoxicity rather than variations in host injury. For instance, maneb has been chosen over ziram for use on tomatoes entirely because it gives better control of late blight than does ziram, whereas the two compounds give essentially the same degree of control of anthracnose fruit rot, and are equally plant safe. This circumstance can also be used as an example of an instance in which specificity may be counteracted by using a mixture of ziram and tribasic copper sulfate to control the tomato-disease complex, depending on the copper compound to furnish the control of late blight, a function in which ziram fails. The same mixture is now being used on cucurbits to provide better control of the disease complex on that crop than either fungicide will give if used alone.

The situation with regard to recommendations for the control of the early and late blight complex on celery furnishes another interesting example of the progressive selection of fungicides for use on that crop. In 1930 Bordeaux mixture and copper-lime dust were being recommended for the control of those diseases. The need for a 6-day spray interval to protect newly developed foliage from infection carried with it the threat of increased plant injury by these comparatively phytotoxic treatments and as a result some of the fixed coppers were selected as substitutes in the late thirties. Then the still better results obtained with the newly introduced dithiocarbamates prompted a change to ziram about 1945 and then to maneb in the early 1950's. Most recently it seems possible that a still newer fungicide called Dyrene may give even better disease control and higher yields than will the copper compounds or the carbamic-acid derivatives. Chemically, Dyrene is 2,4-Dichloro-6-(o-chloroanilino) triazine.

Specificity also rears its head in the new field of soil-treating materials, where it has already been found that one nematocide may give more dependable or better control of a specific nematode than will another. Host specificity is also becoming evident indicating that the nematocide may have to be chosen on the basis of the degree of injury it may, or may not, cause to a specific crop.

Specificity also promises to be a very important factor in regulating the choice of a soil fungicide to control a specific disease attacking a specific crop. For instance, there are, at present, several compounds that will check infection by soil-inhabiting species of Fusarium but only chloropicrin gives any worthwhile control of Verticillium wilt on various species of the Solanaceae. Also, PCNB (Terraclor) may be used to control potato scab with very little evidence of host injury, but it is highly phytotoxic to eggplant, a closely related host species. Another experimental compound has been tested that is capable of giving a considerable degree of control of the root-knot nematode on lettuce, but which actually accelerates the infection of radish by a species of Fusarium.

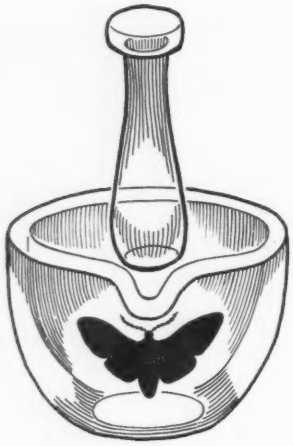
Examples of crop specificity can also be selected from among the list of seed treatment compounds. One of these has to do with the variable phytoxicity of cuprous oxide to various kinds of seeds, since this chemical can safely be used to treat tomato seed but is very injurious to cabbage seed, and Spergon which is safe on many seeds should not be used on beets or spinach.

"Broad Spectrum" Search Goes On

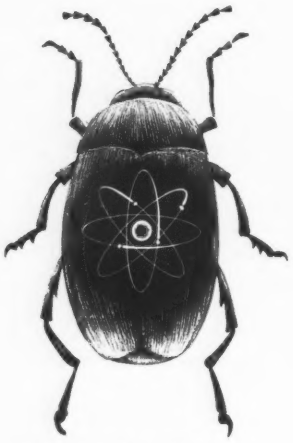
The search for compounds of higher fungitoxicity, more universality of action, as well as lower levels of phytotoxicity and cost, still goes on apace, with the added hope that an effective systemic fungicide may someday be discovered that will make obsolete many of the externally applied materials now in use. If it were not for the extremely high cost of developing, testing, and introducing a new fungicidal compound, it is likely that all of the above goals would be more quickly reached. In the meantime the number and variety of compounds with which the phytopathologist, the dealer, and the grower has to become familiar, will continue to increase to the dismay and perhaps confusion of all concerned.

Dr. J. D. Wilson is Professor of Plant Pathology at the Ohio Agricultural Experiment Station, Wooster, Ohio. *Next month in this section he will discuss organic sulfur compounds, soil fungicides and nematocides, and the use of antibiotics as fungicides.*

NON-CHEMICAL I



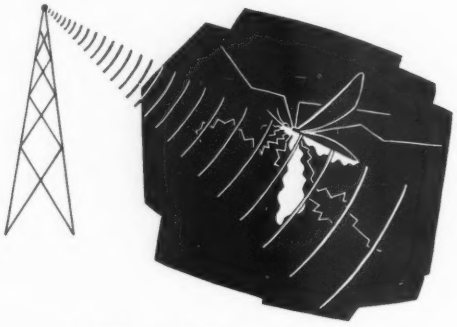
▲ HORMONES
An overdose upsets the balance of life-preserving functions within the insect's body. Three hormones have been discovered and isolated.



▲ ACCELERATED ELECTRON
Grain invested with insects is passed under source emitting accelerated electrons. There is either a kill or sterilizing effect.

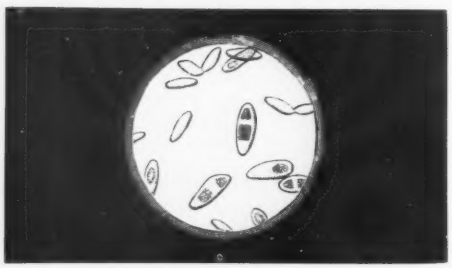
▲ DI-ELECTRIC ENERGY
Invested grain is placed between two metal plates, and the electric field raises temperature rapidly to kill insects.

▲ SILICA GELS
Adsorb wax and/or oil covering of insects; they die by "drying out." Two firms plan to market silica gel insecticides.



▲ ELECTRONICS
A portable unit which emits high frequency radio waves for field-kill of insects is reported to be visualized.

FIRE ANT VENOM ▸
Kills some insects and mites by contact, shows antibiotic activity against molds and several medically important bacteria.



◂ MICROBIAL CONTROL
Two bacterial agents are now available: Bacillus thuringiensis and milky disease spores.

ILLUSTRATIONS BY F. P. GOODRICH

INSECTICIDES

By PETER C. CROLIUS

MEANS OTHER THAN CHEMICAL for destroying pests will, in all probability, be an integral part of farming in the future. Certainly scientific and lay interest in them is growing by leaps and bounds. With directed research and accelerated investment added to increasing basic knowledge and growing command of technology, non-chemical pesticides will take on increased importance, could "take over."

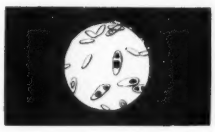
Greatest interest generated thus far in non-chemical pest killers has been in insecticides. Physical, electrical, biological and organic means have been tried with success—small and large, commercial and laboratory. Presented on these pages are several kinds of insecticidal agents (in the broadest sense) which have met with success. Some may insist that a dessicant or a hormone or a microbial agent *is* a chemical, that technically these too are chemical insecticides. It is not the purpose of this round-up to split definitive hairs, but to show what new techniques are in the future.

Flies would cover the earth to a depth of 47 feet in five months if just one pair of house flies lives to maturity and reproduced. Happily, house flies—and all other insects—don't get the chance to multiply unchecked. As do most living things, insects have a host of natural enemies. The weather, bacteria, fungi, parasites and predators including other insects —as well as birds and other animals—all tend to decimate insect numbers.

Man has attempted for years to encourage natural enemies of insects. The score: some successes, more failures. There are about 600 species of injurious insects in North America; less than 100 of them cause really serious damage. Theoretically there is a biological control, a natural enemy for each of them. And that's enough to encourage constant searching.

In mid-December, Pacific Yeast Company, Wasco, Calif., announced that its new "living insecticide" Thuricide had been given a temporary exemption from tolerance by the Food and Drug Administration. (January FARM CHEMICALS, pages 8 and 30). This use of the micro-organism *Bacillus thuringiensis* points up the advantages of anti-insect biological warfare agents. It is relatively specific (shown so far to be most effective against leaf eating insects in the worm stage) and is not harmful to man, other animals or crops. Insects are not known to build resistance. Another firm interested in *B. thuringiensis* is Merck and Co., Inc. According to reports, Merck expects to have its microbial insecticide ready for extensive testing later this year.

Commercially available for several years have been spores of milky disease for use against Japanese beetles. Like *thuringiensis* bacilli, milky disease spores are specific, safe, and don't build up resistance in the host's system. Ingested by Japanese beetle grubs, milky disease spores give rise to vegetative rods which grow and multiply in the blood stream of the larvae, developing in a few days into the spore form. The grub's blood, normally clear, becomes milky looking.



Successes with *B. popillae* spores have been known for years—notably in lawn treatments. However, one drawback to the use of milky disease spores is that the disease takes two or more years to become fully effective. In its favor is the fact that *B. popillae* spores will live for years in the soil—not the case with *B. thuringiensis*.

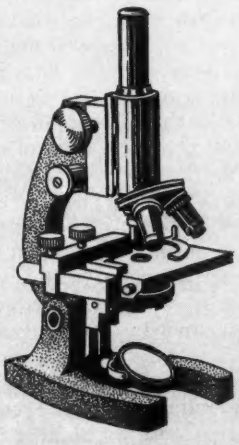
These bacterial agents are but two in what may turn out to be a host of microbial insecticides. Certainly they are the first. They are today's evidence that tomorrow's biological agents can be effective, mass produced, and commercially profitable.

The student learns early in his first brush with

Since World War II, pesticide industry growth has been nothing short of phenomenal. Sales of an estimated $100 million worth of basic technical grade pesticide chemicals in 1945 rose to a recent value of $250 million at that level. But problems have grown with the market.

Two problems confronting pesticide industry management are the development of resistance in farm pests and the development of criticism in people.

There is a creeping public suspicion of methods of fighting insects, weeds, diseases and rodents that are employed today in making farming a more profitable venture and protecting forests. Last spring's so-called "DDT Trial" in New York, passage of the Magnuson Bill for wildlife-pesticide research and opposition to the federal-state fire ant eradication program are indications that the public is concerned.



Pests have been concerned too. And they have been able, at times, to throw up a barrier against modern chemical pesticides. Their mechanism for surviving toxic chemicals is an old one: hereditary selection for resistant strains—"the survival of the fittest." Pests, shrugging off a compound that would have been devastating to earlier generations, are constantly spurring on man's continuing grand-scale search for new chemical pesticides.

Resistance and public criticism, while they are being counteracted by new chemical pesticides, application techniques and the intensified educational programs of the National Agricultural Chemicals Association, are two reasons why research and development have been looking more and more outside the chemicals storehouse for solutions to farm pest control problems.

physics that all life on earth depends on something called the "electromagnetic spectrum." Once he has mastered a few basic facts, he is suddenly aware that the light we see, see by, and which gives us life is but a minute portion of the total spectrum—that also from the spectrum are applied rays and waves which give us television, radar, radio, x-ray machines, and such conveniences as hot running water and frozen foods.

Scientists and engineers have separated the spectrum and harnessed the components to good advantage through an army of machines and devices aimed at giving off and receiving radiant (spectral) energy. It is in this area that the most spectacular advances in killing insects might well be made. Planned and unplanned devices would appear, by today's standards, to be strictly something created by Rube Goldberg. Yet they could be tomorrow's life savers. People *are* thinking along these lines.

PARTICLE RADIATION IN GRAIN

Current work and thinking towards the goal of effective and economic pest control through electricity has taken two main directions—accelerated electron and di-electric energy investigations. Research to date has been mostly with insects in stored grain.

Investigators of the U.S. Department of Agriculture and cooperating state universities are quick to point out that as concerns particle radiation (gamma, beta, and cathode rays and x-rays) in deinfesting stored grains of insect pests, "there is a great deal of additional research necessary before practical commercial use may be made." In theory the method is relatively simple . . . but may prove to be difficult in quantity practice. Grain infested with insects is passed under a source emitting accelerated electrons. Depending on the amount of radiation received by the insects, there is either a kill or a sterilizing effect.

The variables in such a process are many: stage of the insect, species differences, time under radiation, amount of radiation, etc. Effects on the grain itself must be considered. For instance, researchers found in one series of tests that quick kill at 100,000 roentgens for ¾ of a minute was best from the deinfestation standpoint but they also discovered that at that high degree of radiation bread made from the treated grain had an off-flavor.

Sources of accelerated electrons have also varied. Cobalt 60, Cesium 137, cathode tubes, and x-ray tubes have been tried. It is entirely possible that as our knowledge of nuclear materials increases, other electron sources will become available for trial.

Direct costs of treating infested grain with accelerated electrons appear to be relatively low. A USDA report published in 1954 states that to treat a bushel of grain, cost of energy ran about .013¢. Other costs would be for maintenance and amortization of the machines. (One million-volt radiographic unit carried in 1954 a price tag of around $60,000).

In speaking of accelerated electrons, it is only fair to mention in passing the successful screwworm eradication program now underway in the Southeast. Combining both the biological and electrical approaches, millions of male screwworms, sterilized by gamma rays from Cobalt 60, are being released over Florida, Georgia, and Alabama. Mating with normal females, reproduction is nil, and screwworm populations are declining. Whether or not these same techniques can be applied elsewhere to other destructive pest remains to be seen.

DI-ELECTRIC HEATING RESEARCH

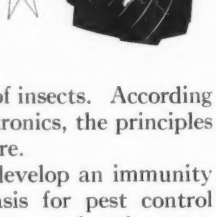
Research at the Nebraska Experiment Station is aimed at killing stored grain insects by di-electric heating. Simply, this means placing infested grain between two parallel metal plates which form part of an electronic power oscillator. This is similar to equipment used for radio and television transmitters. Setting up an electric field of several thousand volts between the plates, temperature of the infested grain is raised rapidly—as much as 50 or 60 degrees in three or four seconds.

The rate of heating depends on the electrical characteristics of the material being treated. If insects have electrical characteristics more favorable for heating than the grain, body temperatures can be raised to the killing point without damage to the grain itself.

Main problems facing Nebraska researchers are that different temperatures are necessary to kill different insects in different stages of development. Moisture content of grain plays an important part in deinfestation by di-electric heating, particularly at higher temperatures. A report from Nebraska implies that di-electric heating may be commercially feasible without great difficulty.

ELECTRONIC UNITS VISUALIZED

Although hard to pin down, rumors crop up from time to time that various portable electronic devices similar to radio transmitters or radar units are being looked at with some interest. At least one large electronics equipment manufacturer, it is reported by reliable sources, has visualized a tractor-trailer unit which emits high frequency radio waves for field-kill of insects. According to what's now known about electronics, the principles and methods involved are obscure.



That no known creature can develop an immunity to its own hormones is the basis for pest control applications of current hormone research. An overdose of these vital body secretions upsets the delicate balance of life-preserving functions within an insect's body. Result: freaks, misfits, abnormal changes—all leading to death.

While somewhat sensationalized for the general reading public, last November's *Life* magazine article nevertheless presented a number of sound, thought-provoking ideas about future insecticides involving the hormone approach. "The work of a dozen scientists on three continents over a 40-year period . . ." has been, until recently, purely academic—the painstaking building of a fascinating body of pure knowledge. Dr. Carroll Williams of Harvard and two

(Continued on page 34)

PEST REPORTS

*By Kelvin Dorward**

Results of the cooperative fall ***cotton boll weevil*** survey have been reported from North and South Carolina, Virginia and Louisiana areas. All areas show counts below those for the 1957 fall survey. In Louisiana trash samples were collected in Madison, East Carroll and Tensas Parishes. Samples from Madison Parish had an average of 5,326 live weevils per acre. The average for East Carroll Parish was 9,845 and Tensas Parish 2,098 live weevils per acre. Average for the three parishes was 5,756. Similar records have been made in Madison Parish for 23 years beginning in the fall of 1936, and only in 1955 and 1957 were the counts higher in this parish. The 1955 counts were 13,443 and those of 1957 were 6,860.

Woods trash samples taken in Orangeburg, Bamberg and Dorchester Counties, South Carolina, which has been designated as area 1 of the Carolinas and Virginia cotton boll weevil hibernation survey, had an average of 997 live weevils per acre as compared with 3,978 for 1957.

Florence, Darlington and Marlboro Counties, South Carolina, and Scotland County, North Carolina, which comprise area 2 averaged 4,625 live weevils per acre. Average for this area in the fall of 1957 was 11,374 per acre.

Area 3, composed of Anderson, Greenville and Spartanburg Counties, South Carolina, and Mecklenburg, Cleveland and Union Counties, North Carolina, averaged 2,635 live cotton boll weevils per acre as compared with 6,752 for the 1957 fall survey. The average found in the 1958 fall survey for area 4 comprised of Edgecombe, Franklin, Nash and Wilson Counties, North Carolina was 968 live weevils per acre as compared with 2,205 for 1957.

Live cotton boll weevils found in woods trash in area 5 which includes Brunswick, Mecklenburg, Nansemond and Southampton Counties, Virginia, averaged 511 per acre. This is considerably lower than the 3,335 average found for the same area in the fall of 1957.

Extensive finds of the ***pink bollworm*** in Maricopa and Pinal Counties, Arizona, since the first find in Maricopa County in July, have resulted in extension, by the Arizona Commission of Agriculture and Horticulture, of the state pink bollworm quarantine to include all cotton growing counties except Yuma and Yavapai. Although Cochise County was previously included in the quarantine, the first pink bollworm for the season in that county was found during November. This specimen was taken from gin trash at Willcox. During November, infestations were found on 106 properties totaling 7,321 acres in Maricopa County and 10 properties totaling 1,800 acres in Pinal County, Arizona.

A survey in late November in the more heavily infested area of Dona Ana County, New Mexico, showed that low temperatures had caused a high mortality of pink bollworms in bolls on standing stalks. It was estimated that more than 90 per cent of the larvae were killed. No live larvae were found in green bolls, and very few in open bolls. In Oklahoma approximately 60,000 acres of cotton were found infested for the first time. The first positive collections were also made in Cleburne and Mississippi Counties, Arkansas.

All survey work for the pink bollworm in California through the season was negative. The same was true for Alabama, Mississippi and Tennessee.

The annual ***chinch bug*** survey in Arkansas showed a larger number of bugs in hibernation in the 17 counties surveyed than was found in the 1957 survey. Hibernation counts were rated as severe in six counties compared with three last fall. Averages per square foot of hibernation area counted were as follows: Randolph County, 1,971; Poinsett, 1,825; Jackson, 1,125; Lawrence 1,606; Clay, 1,746 and Cross, 1,924. The heaviest hibernation counts were in the northeastern part of the state. One county in Oklahoma was found to have a rating of very severe, 2,000 or more chinch bugs per square foot in hibernation. Severe ratings, 1,000 to 2,000 bugs per square foot, were recorded for Cleveland, Hughes, McClain, Okfuskee and Seminole Counties. Ratings in other Oklahoma counties surveyed were below the severe rating.

The ***greenbug*** was still being found during late fall and winter in several of the winter grain growing states. Infestations on fall-seeded oats in Arkansas were more common and heavier than in most years. Breeding plots at Stuttgart were treated for the pest in late November. Oats in the east and northeast were generally infested with small populations but one Poinsett County field averaged 75 chinch bugs per linear foot.

In a survey of 17 northwestern Oklahoma counties, scattered infestations of the greenbug were found in 13 counties. The highest average was 27 per linear foot, and 3–7 was the general range over most of the area. Three counties did not show any counts. Infestations were found in most of the panhandle section of Texas, with one area of Carson County averaging 10 greenbugs per linear foot. Counts in New Mexico averaged 0.5–1.5 per linear foot in 50 per cent of the wheat fields examined in Quay, Curry and Roosevelt Counties.

The ***spotted alfalfa aphid*** continued active in several states during December. Populations ranging from 205 to 1,826 per 5 plants were found in the north central Kansas area and from 427 to 652 per 5 plants in Riley and Pottawatomie Counties of the northeastern area. Moderate to heavy infestations were still found in the central Oklahoma area despite sub-

*Chief Staff Officer, Survey & Detection Operations, Plant Pest Control Div., Agricultural Research Service, USDA.

freezing temperatures and snow. Light, widespread infestations were found on alfalfa in Rockwall County, Texas, but weather checked an indicated build-up. ▲

KANSAS REPORTS FIRST FIND OF ELM LEAF BEETLES

Elm leaf beetles have been reported in Kansas for the first time, according to Hugh Thompson, entomologist at Kansas State College, Manhattan. He identified the beetles from specimens sent in by a Dodge City housewife.

Long a serious pest of elms east of the Mississippi river, only in the last few years have the beetles been a problem west of the Mississippi.

The new pest is not a tree killer, but does cause elm trees to lose all their leaves each June. East of the Mississippi the elms put out new leaves in July and August, but Thompson questions whether this will occur under Kansas conditions.

Beetles emerge from hibernation the early part of June and proceed to chew away the lower leaf surfaces. Then the remainder of the leaf crinkles up, turns brown, and falls off the tree. Thompson said the Kansas agricultural experiment station and the Kansas entomological commission would join next June to survey the extent of elm leaf beetle infestation in Kansas.

Thompson said that in many instances the elm leaf beetles prove to be a bigger nuisance in the household than they do on the trees. In winter the beetles hibernate in large numbers in protected places and become a household pest around doors, windows, and fireplaces through which they gain entrance to the house. ▲

NON-CHEMICAL INSECTICIDES

(Continued from page 32)

German scientists, Karlson and Butenandt, are responsible for shedding light on the potential commercial aspects of insect-produced hormones against insects.

Paving the way for insecticidal considerations were the discovery and isolation of three hormones from insects: a brain hormone which stimulates the production of a second hormone, ecdysone, which triggers the molting process, and the so-called juvenile hormone which prevents the insect from growing up too fast.

Williams and two other investigators are now trying to find the precise chemical make-up of the hormones.

The scientists have already determined that once the chemical formulas are found, it will be possible to make hormones synthetically and that the molecules will be simple and stable. A further step in the future will be the varying of the molecular structure so that hormone insecticides will be fatal to one species but not to another. As knowledge now stands, ecdysone and juvenile hormone extracted from one insect create changes in any other insect.

Says Albert Rosenfeld in *Life*, "Even the man who is middleaged today should, in his lifetime, see the day when he no longer has to share his corn with the chinch bug and his cotton with the boll weevil."

Some good may come from the fire ant after all. But don't ask the man who's been stung. Ask entomologists at Louisiana State University. They've uncovered some interesting facts about fire ant venom. (January FARM CHEMICALS, page 51.) Venom exhibits, say LSU researchers, strong antibiotic activity against several medically important bacteria. The venom also kills molds. (Antibiotics generally are active against bacteria *or* molds but seldom against both.) Fire ant venom also kills some insects and mites by contact,

yet the ant is nearly immune to its own venom. All venom samples don't show the same degree of insecticidal activity, but highly active ones "were at least the match of DDT, producing an instantaneous paralysis similar to that caused by nerve poison."

DEATH BY EVAPORATION

Silica gel powders—used in tooth paste, body dusting powders, gas masks, etc. are now coming into their own as physical insecticides. While no information is extant on agricultural insect control in the field, silica gel powders have proven effective against cockroaches, dog fleas, termites, wasps, spiders, and a host of insect pests found in homes and warehouses, stores and railroad cars.

Silica gel powers kill insects by adsorbing wax and/or oil that covers their bodies and normally prevents loss of vital body moisture. Deprived of this moisture, insects literally die by drying out. The pest usually dies when it has lost about half its water content or about 30 per cent of its body weight.

The new dust insecticides are non-toxic to man and animals, retain their effectiveness indefinitely, and, as far as is known at present, insects don't develop resistance to the powder, says Dr. I. Barry Tarshis of the University of California. Dr. Tarshis and Dr. Walter Ebeling, also of California, have pioneered insecticide work with silica gel powders. (November FARM CHEMICALS, page 53.)

Both W. R. Grace & Co. Davison Chemical Division (Dri-Die) and Monsanto Chemical Co. (Santocel C) plan to market silica gel insecticides. Neither company has its product for sale (pending permanent registration by the U. S. Department of Agriculture) although experimental quantities have been released for commercial evaluation in household pest control.

All knowledge is based on prior knowledge. In pointing out here what non-chemical insecticide approaches look promising for the future, we must also consider these methods and those which remained unnamed as stepping stones to an even wider variety of methods to control insect pests. ▲

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MATERIALS HANDLING

CUSTOM APPLICATION

- *Systemic insecticides look promising against Hessian fly*
- *Japanese beetle eradication area reveals control and side effects*
- *Performance of liquid and dry mixed fertilizers seen virtually equal*

APPLICATORS go to SCHOOL

HERE IS HOW one authority says the farmer can consider his question: "Shall I put on liquid or dry this year?" Dr. Samuel R. Aldrich, professor of soil extension at the College of Agriculture, University of Illinois, told those attending the Eleventh Illinois Custom Spray Operators' Training School that the farmer's choice of either liquid or dry mixed fertilizer would depend on 1) agronomic considerations, 2) cost of nutrients applied on the field, 3) availability of equipment to handle, store and spread, and 4) ease of handling.

Explaining that the farmer could best determine the part played by the last three factors in his own operation, Aldrich took up the agronomic points:

"It is the consensus that for most farm situations in Illinois liquid mixed fertilizers and dry mixed fertilizers may be assumed to be equal in performance," he said. "Where differences occur, they are not likely to consistently favor either form. Farmers may therefore select on the basis of cost per pound of nutrients from the dealer, plus special considerations in handling, storing and applying the two."

Nitrogen may be supplied in several ways in both liquid and dry mixed fertilizers. "In the final product as used by the farmer the nitrogen occurs as an ammonium salt, urea, cyanamide or nitrate. Some fertilizers, both liquid and dry, contain all three forms. There is no special advantage of either liquid or dry fertilizer with respect to forms of nitrogen," he said.

In liquids, the phosphorous is supplied entirely by phosphoric acid, the agronomist said. The acid is neutralized by the ammonium hydroxide of the nitrogen source (ammonia, for example, added to water produces ammonium hydroxide, which neutralizes the acidity). Thus the phosphorous, in the form of ammonium phosphate, is all water soluble.

In dry mixed fertilizers, the phosphorous comes from phosphate rock that has been treated with either sulfuric, phosphoric or nitric acid. Following ammoniation of this, he pointed out, "the phosphorous in dry mixed fertilizers may be in several forms differing mainly in their water solubility." Whether or not the water solubility is significant in the field depends on many things, but he stated that in *broadcast* applications, high water solubility is not an advantage.

Referring to nutrient availability in dry soil, Aldrich said, "in practice there is not likely to be a measurable difference" between liquid and dry fertilizers. "The water in liquid fertilizer, when put on an acre basis, is negligible," he showed. "Dry fertilizer absorbs moisture and goes into solution unless the soil is very dry. Liquid fertilizer, on the other hand, would soon lose moisture and crystallize out in a very dry soil."

In a moist soil, he stated, "no practical difference in rate of availability is expected" because, he explained, "a significant amount of the water-soluble nutrients in a dry fertilizer will go into solution within a matter of hours, or at most a few days."

Comparing possible ratios and analyses, Aldrich said the range in ratios is somewhat more limited in liquid fertilizers than in dry—with presently available materials. And there are also more analyses possible with dry fertilizers. But this advantage, he claimed,

This row crop sprayer-duster, developed cooperatively by U. S. Department of Agriculture and state researchers, has been unusually effective in controlling green peach aphids that attack the underside of leaves of potato plants in tests during the last three years in Oregon and Washington. Reports say a few minor modifications can adapt it for spraying or dusting other insects on various low-growing crops with different row spacings. Agricultural engineer Vilas D. Young and entomologist Joseph C. Chamberlin of USDA's Agricultural Research Service at Forest Grove, Ore., developed the equipment. Treating booms may be moved horizontally and vertically.

is "somewhat offset by the ease of moving liquids by pumping."

In 1958, Illinois began experiments to compare crop yields using liquid and dry fertilizers. Aldrich said that "results in several states have usually shown small differences that have not consistently favored either liquid or dry fertilizers when the same amounts of nutrients were applied."

Some Side Effects of Spraying To Eradicate The Japanese Beetle

Dr. W. H. Luckmann, associate entomologist, Illinois Natural History Survey, summarized observations of Survey researchers during a five-year period in the Japanese beetle eradication area at Sheldon, Ill.

Treatment was begun in 1954 by federal and state plant pest control workers, using aerial applications of either sprays or granules at the dosage of three pounds technical dieldrin per acre. Only granules were used from 1955 to 1958, at both two and three pounds per acre in 1955, two pounds per acre during the succeeding years. In addition, roadsides throughout the infested area were treated with sprays of one pound of DDT. Each area received one treatment.

Reporting his observations on insects, Luckmann said that "many common economic insects that come into occasional or frequent contact with the soil were quickly eliminated from the treated area, and some species were still not present five years after treatment . . . On the other hand, populations of some insects increased noticeably, even though many very important predators appeared not to be greatly affected by the insecticide."

"One of the most interesting effects of dieldrin on an insect concerned the Japanese beetle," he continued. "The treatment applied early each spring killed only about 50 per cent of the larvae in the soil at the time of treatment, although large numbers of poisoned grubs would crawl to the surface and die. Adult beetles were usually numerous in a treated area during the July and August following treatment. However, larvae hatching from eggs laid during the summer in the treated soil were killed. Soil treated in the spring of 1954 with three pounds of dieldrin per acre and repeatedly plowed and cultivated was still free of Japanese beetle grubs in the fall of 1958."

Farm animals also were observed by the scientists. "It appears that such livestock as cows, hogs, sheep and chickens will not be adversely affected when dieldrin is properly applied in granular form at a dosage of three pounds per acre," the entomologist said. But, he added, "aerial sprays of the same amount of dieldrin or even the drift from these sprays can seriously affect farm animals, particularly sheep."

Systemics Now Appear Promising For Control of Hessian Fly on Wheat

"The Illinois Natural History Survey, among other institutions, is now investigating the possibility of using systemic poisons to control Hessian fly," Dr. J. H. Bigger, Survey entomologist, told the group. "Success with our investigations," he continued, would allow the farmer to "disregard present time-of-planting advice if he was willing to spend his money for insecticides."

Application methods were seed treatment before planting (½ to ¾ lb. actual Thimet per 100 lb. seed and 1 lb. actual Di-Syston per 90 lb. seed) and granules applied through fertilizer attachments on wheat drills (at 1 and 2 lb. actual Thimet per acre and 2 lb. actual Di-Syston per acre.) The materials were applied to wheat planted early and at the recommended date.

"With each of the (early) treatments, we have obtained 90 per cent control or better." He reported, however, that Thimet seed treatment "severely reduced plant populations" and granule treatment at 2 lb. per acre also caused a "significant reduction in stand." The lighter granular treatments "have not caused damaging losses in plant populations." In only one year's testing, Di-Syston "has not shown the severe phytotoxity mentioned for Thimet . . ."

"Results for fly control have been nil with wheat planted at recommended dates," Bigger said.

Bigger pointed out that the Food and Drug Administration has not approved use of systemics on wheat seed or in wheat fields.

"The results of our experiments as well as those in other midwestern states are promising, and it appears that we will soon be able to make a recommendation for the use of systemic insecticides on early-planted wheat for those who wish to follow this practice," he reported. Although a recommendation is not being made for 1959 plantings, "widespread" demonstration-test plots are planned. ▲

Time out for informal discussion was taken during the Illinois Custom Spray Operators' Training School. Left to right are: Harold Geuther, Niagara Chemical Div., Wyoming; Vernon Anderson, ground spray operator from Newark; Earl Davies, ground spray operator, Mazon; Edward Sertl, G. S. Robins Co., St. Louis; and Steve Moore, extension entomologist with the University of Illinois and Illinois Natural History Survey. More than 600 people attended the school, held on the University of Illinois campus in Urbana, January 28-29.

NEWS OF THE INDUSTRY

GRANULATION FACILITIES ADDED TO DAVISON PLANT

Construction of a $500,000 addition to its fertilizer plant at Ft. Pierce, Fla., has been started by W. R. Grace & Co. Davison Chemical Div. The new equipment to make granulated fertilizers will be the first source of such products in the Ft. Pierce area, Grace reported.

Davison's continuous granulation process is now operating in its plants at Baltimore, Md.; Alliance, Findlay and Columbus, Ohio; Lansing, Mich.; New Albany, Ind.; Joplin, Mo.; Perry, Iowa, and Tulsa, Okla.

HEYDEN NEWPORT BUYS RIGHTS TO BFG'S STROBANE

Strobane, a terpene-based insecticide, has been purchased by Heyden Newport Chemical Corp. from B. F. Goodrich Chemical Co.

Heyden Newport will have all rights to manufacture and sell Strobane. Extensive field testing has shown that the insecticide has a broad range of activity in control of agricultural pests, the announcement said. The chemical is now on the market for home use, in liquid and aerosol formulations.

"Its promising performance, combined with our basic position in terpene chemicals, points to an important role for Strobane in our expanding agricultural chemical program," said S. Askin, president of Heyden Newport.

SHELL REORGANIZES TO REFLECT PRODUCT LINES

Shell Chemical Corp. President Richard C. McCurdy has announced a company reorganization, effected Jan. 1. Four additional fully-integrated divisions have been formed, bringing the total to five.

Each division, headed by a general manager, will engage in one of the five main lines of business of Shell—agricultural chemicals, ammonia, industrial chemicals, plastics and resins, and synthetic rubber.

Under the new arrangement, the head office will be concerned mainly with matters involving more than one division or of interest to the company as a whole. Four vice presidents—Cecil W. Humphreys, George R. Monkhouse, Bernard M. Downey and George W. Huldrum, Jr.—will be engaged in this work.

McAllister

The Agricultural Chemical Div. is headed by Sumner H. McAllister, former manager of the Agricultural Chemical Sales Division.

Other divisions and their general managers are: Ammonia—Lawrence M. Roberts, Industrial Chemicals—Alfred W. Fleer, Plastics and Resins—Martin Buck, Synthetic Rubber—John P. Cunningham.

SINCLAIR CHEMICALS CHANGES ITS NAME

The name of Sinclair Chemicals, Inc. has been changed to Sinclair Petrochemicals, Inc., John A. Scott, president, has announced.

Personnel, offices and operations remain unchanged. Sinclair Petrochemicals is a wholly owned subsidiary of Sinclair Oil Corp.

AP&CC UPS PRICE OF SODIUM CHLORATE

American Potash & Chemical Corp. has announced a price increase of one-half cent per pound for sodium chlorate packaged in steel drums and sold in the 11 western states.

Effective January 1, the price is 10½ cents per pound for carload lots, f.o.b. Henderson, Nev. There is no change in the price of bulk or tank car lots.

NEW CORPORATIONS

Roseboro Fertilizer Co., Inc., Dunn, N. C., has been granted a charter of incorporation, listing authorized capital stock of $50,000. Incorporators are Nido L. Hamilton, Stella, N. C.; O. L. West, Jr., Dunn, N. C.; and W. T. McLean, Clinton, N. C.

Dixie Fertilizer Co., Inc., Meridian, Miss. has been granted a charter to manufacture fertilizer. The firm plans to erect a plant adjacent to the City of Meridian's new sewage treatment plant, and use the activated sludge from the treatment plant as base material for fertilizer.

NITROGEN DIV. HONORS 4-H'ERS

National winners in the 4-H Field Crops program are congratulated by Jacob White, president of Nitrogen Div., Allied Chemical Corp. Donor of the awards for field crops, Nitrogen Div. honored state and national winners at a banquet in Chicago during the 4-H Club Congress. Pictured are, left to right, Ralph Peterson, Kansas; Robert Mott, New York; Billy Denson, Mississippi; Gordon Mason, California; Tevis Williamson, Virginia; and Mr. White. National winner Jack King, Nebraska, is not in the picture.

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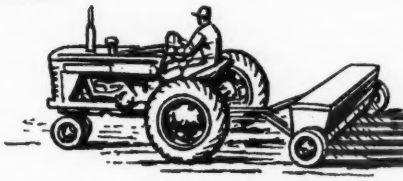
YOU cut cost with combined carloads from one basic source.

YOU can save money, time, plant space and effort through the use of our custom formulated mineral mixture service.

WE back up our products with service, research and technical assistance.



Make request on your Company letterhead for samples or literature.

NUTRITIONAL TRACE ELEMENTS ARE OUR BUSINESS

Foliar Nutritional Products Include **NU-IRON**
NU-Z, ES-MIN-EL

TENNESSEE TC CORPORATION

617-629 Grant Building, Atlanta, Georgia

DUVAL AND ASHCRAFT EXTEND CONTRACT

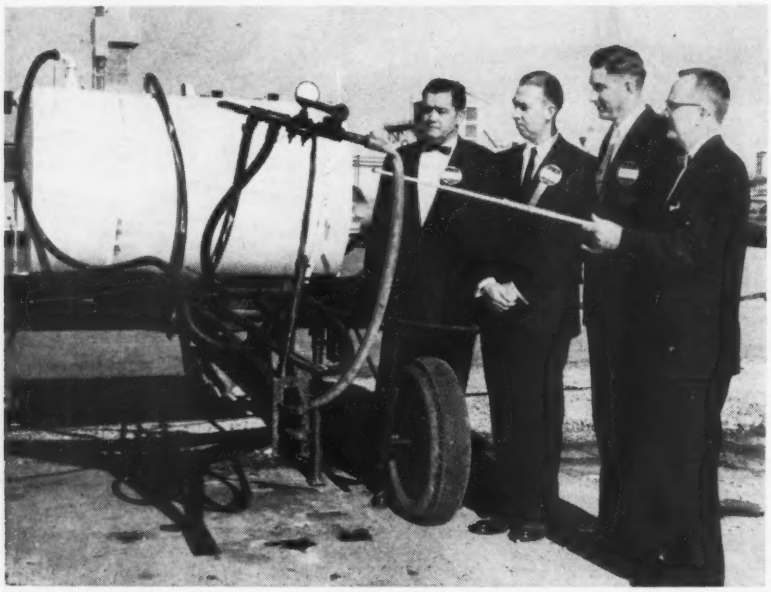
Duval Sulphur & Potash Co. and Ashcraft-Wilkinson Co. report extension of the contract under which Ashcraft-Wilkinson represents Duval as its exclusive sales agent for potash and domestic sulfur.

The agreement, which began when Duval entered the sulfur industry some 30 years ago, has continued without interruption. In 1950 it was extended to include Duval's muriate of potash production.

MONSANTO LTD TO BUILD MALEIC ANHYDRIDE PLANT

Monsanto Chemicals Ltd., London, England, will erect a 15,000,000 pound per year maleic anhydride plant at Newport, Monmouthshire, England, said to be the largest to be built outside of the U. S. Scientific Design Co. and its affiliates will undertake the project, using an SD process, which produces maleic anhydride by continuous, catalytic, vapor-phase air oxidation of benzene. The plant is scheduled for completion in the latter half of 1960.

Spencer Sponsors 'Ura-Greeen' Show



Examining application equipment at Spencer Chemical Co.'s "Ura-Greeen" Show in Henderson, Ky. are (left to right) Joe Tuning, manager of direct application solutions; R. D. Wallace, Henderson Works manager; Nelson Abell, Ouachita Fertilizer Co.; and Harold Bingham, general manager, agricultural chemical sales, Spencer.

A "Ura-Greeen" Show was held by Spencer Chemical Co. in Henderson, Ky., December 11-12.

To open the event, some 60 liquid fertilizer mixers viewed Spencer's Henderson Works and the urea production facilities which were completed recently.

The following day, at a seminar, they heard Brown Beasley, Spencer agronomist, and Nelson Abell, Monroe, La., fertilizer mixer, discuss nitrogen solutions. Beasley reviewed the chemistry of nitrogen solutions and compared yield results from experimental plots that used several forms of nitrogen. In nearly all cases, he said, the nitrogen solutions gave equal—if not superior—yields.

In a discussion of the mixer's side of the solutions business, Nelson Abell of the Ouachita Fertilizer Co. reviewed his experiences with various methods of solution application, including spraying by air and mixing with irrigation water. Abell said that corrosion was the number one problem for the liquid mixer and distributor, and stressed the importance of a good maintenance program.

The "Ura-Greeen" Show followed closely the completion of a 100-ton-per-day urea plant at Spencer's Henderson Works. Both prilled urea and non-pressure Ura-Greeen solutions will be shipped from the works.

CYANAMID HONORS 15 AGRICULTURAL SALESMEN

American Cyanamid Co.'s Agricultural Div. presented Star Club Awards to 15 outstanding salesmen at a banquet honoring the winners at the Savoy-Hilton Hotel, New York, Dec. 12. The salesmen were welcomed by F. S. Washburn, divisional manager.

B. F. Bowman, director of marketing, said nominees for the Star Club were selected because they demonstrated abilities and performance which deserved recognition.

Among speakers who addressed the banquet were A. B. Clow, vice president of marketing, and C. D. Siverd, assistant manager for the Agricultural Div.

Clow emphasized the "quality of enthusiasm" in salesmanship and pointed out that no top flight salesman lacks it.

How careful planning works—to solve complex problems and offer better service to customers—was highlighted in Siverd's address.

Salesmen from Cyanamid's Agricultural Div. who received Star Club Awards for 1959 were Floyd L. Bull, Joseph B. Spillman, Stewart B. Howe, Robert S. Moon, Joseph Nicholson, Norman A. Alton, Richard T. Piercy, Alfred M. Green, John R. Baker, William H. Dearen, Carl F. Steinke, Albert M. Brown, Donald H. Lee, Franklin Allen and Loren E. Fairlee.

AGRICO BUYS DEEP-ROOT FERTILIZERS PLANT

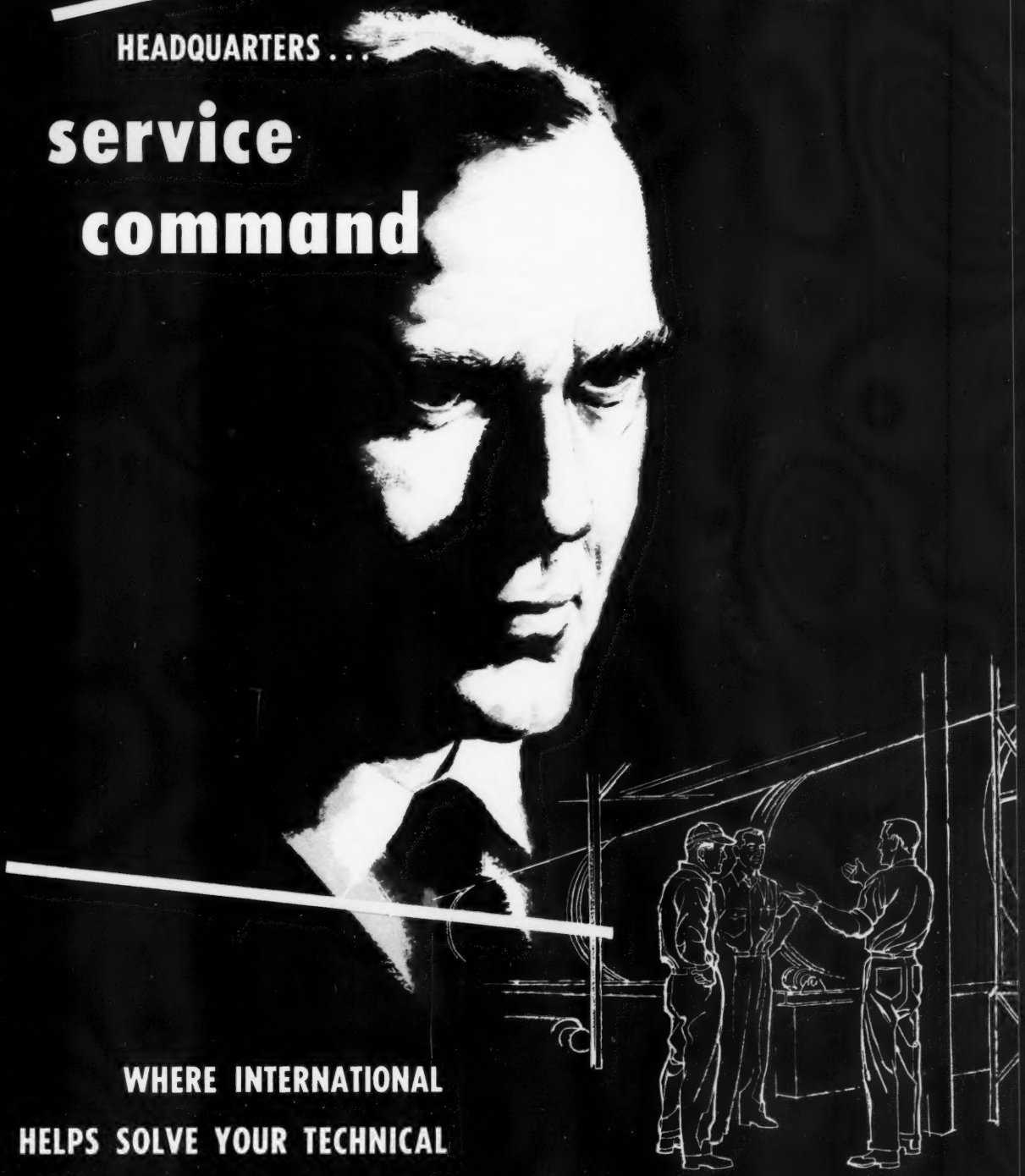
On Jan. 15, negotiations were completed for purchase of Deep-Root Fertilizers, Inc., Olathe, Kansas, by The American Agricultural Chemical Co. The announcement was made in New York by C. M. Powell, AAC president.

This is the company's first plant west of the Missouri River. There are 37 AGRICO manufacturing plants in all.

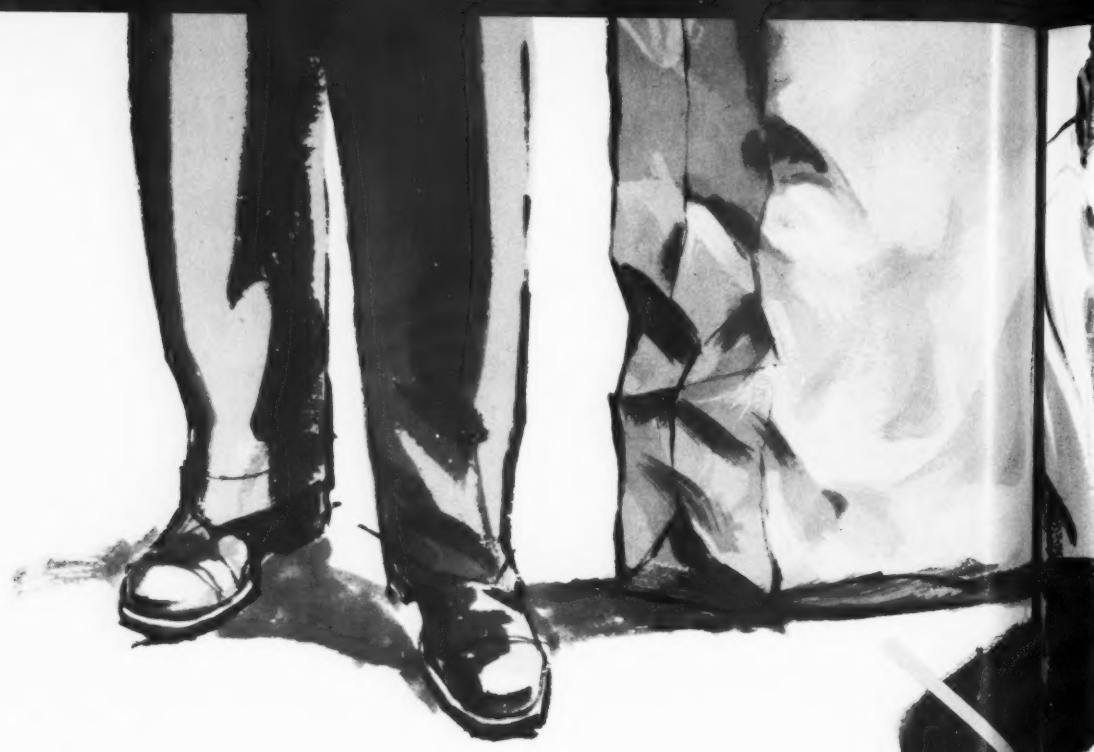
INTERNATIONAL'S
FULL ORBIT
SERVICE

HEADQUARTERS . . .

service command



WHERE INTERNATIONAL HELPS SOLVE YOUR TECHNICAL IN-PLANT AND PRODUCT PROBLEMS



Triple-super trouble shooter

International's Service Command helps you profit from our experience . . . complete and personalized service with no obligation . . . solves your problems in:

FORMULATION

We can help you select types of nitrogen solution and/or anhydrous ammonia; figure sulfuric acid requirements; choose type and particle size of potash; determine the proper combination of phosphoric acid and triple super to be used. Also International's technical trouble-shooters will work out problems concerning the use of steam and water in system . . . and recycle rates if granular product is being made. In short, International Minerals will help you through the full cycle of formulation problems.

CHOOSING EQUIPMENT

IMC personnel have worked with virtually every kind of equipment in the fertilizer industry. Because of this varied experience we are able to pass on to you information that will help you adapt or replace your present equipment at minimum cost.

PLANT LAYOUT

Our technical staff can help you plan plant layout changes. If you desire, our engineering department will evaluate the efficiency and cost factors of your plant layout and make recommendations that will save you money.

MATERIALS HANDLING

International Minerals processes millions of tons of materials a year. Result is valuable experience — that you can draw on — in reducing handling costs through correct use of conveyors, fork trucks, car loading equipment, etc.

STATISTICAL QUALITY CONTROL

Refer any formulation problem requiring computer applications to International's Industrial Engineering Staff. Our engineers also offer statistical quality control assistance when a process requires correction.

RESEARCH

International's Research Division maintains facilities at Skokie, Ill., and Mulberry, Fla., to test the action of plant nutrients. *This information is yours.* International also sponsors many university and state experiment stations, the results of which are circulated by our technical staff. You can profit from IMC research into plant food requirements for local areas and from other phases of our complete research into fertilizer production, uses and results.

To avail yourself of our personalized Service Command help, call on International Minerals & Chemical Corporation, Administrative Center, Old Orchard Road, Skokie, Ill.

COARSE — International's coarse-textured Triple gives you the same excellent ammoniation batch after batch . . . promotes desirable agglomeration.

GRANULAR—International's granular Triple is non-crumbling, free-flowing, makes granulation easier. Sponge-like structure of granules facilitates ammoniation.

RUN-OF-PILE — International's fine-textured Triple provides uniform particle size, even density and proper moisture level that lets you ammoniate at higher rates, temperatures.

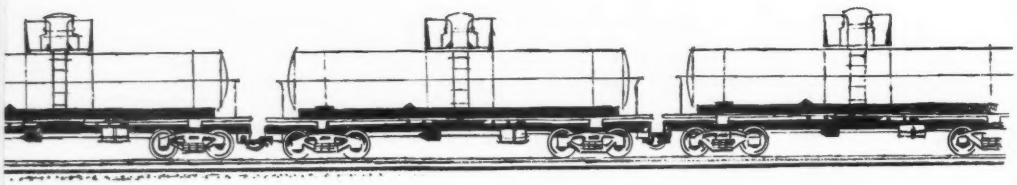
TRIPLE SUPERPHOSPHATE

Available P_2O_5 (min. guarantee) — 46.0%

Particle size:

	R.O.P.	GRANULAR	COARSE
—6 mesh	98-100%	98% min.	97%
—65 mesh	22.34%	0.5% max.	15%

Technical Service Command helps you get full value from your phosphate dollar



A complete line of triple superphosphates and phosphoric acid solves formulation problems

Now you can make International your dependable single source of all high-analysis phosphate ingredients. Benefit from International's three grades of top-quality triple superphosphate plus high purity 53%-55% phosphoric acid. And expert trouble-shooting assistance is yours — on call — from International's Service Command.

Creators of Living Minerals

MINERALS International CHEMICALS

INTERNATIONAL FULL ORBIT SERVICE

PHOSPHATE DIVISION

INTERNATIONAL MINERALS & CHEMICAL CORPORATION

Administrative Center: Skokie, Illinois

READER SERVICE

FREE INFORMATION to help you solve fertilizer, pesticide problems

Chemicals

44—658 FUNGICIDE

Folders and technical information on Miller 658 Fungicide now are available from Miller Chemical & Fertilizer Corp. Union Carbide Chemical Co. developed "658," which Miller is licensed to manufacture and distribute. Active ingredient of the fungicide is a copper zinc chromate complex. For information including properties, compatibility, toxicity, uses registered with USDA and performance data,

CIRCLE 44 ON SERVICE CARD

45—IGEPON BOOKLET

"Igepon Surfactants," a new 16-page booklet published by Antara Chemicals Sales Div. of General Aniline & Film, gives properties and uses of the company's Igepon series of anionic surfactants. The booklet states that Igepon AP-78, T-43 or T-77 promote fast wetting and stable dispersion in pesticide powders. Copies can be obtained by

CIRCLING 45 ON SERVICE CARD

46—TERRACLOR

Formulators can obtain complete information on Terraclor (PCNB) for control of soil-borne diseases. The chemical, produced by Olin Mathieson Chemical Corp., is available as a 75 per cent wettable powder and technical grade. For details,

CIRCLE 46 ON SERVICE CARD

47—WEED CONTROL BULLETIN

Stauffer Chemical Co. has just published an illustrated brochure describing applications of its selective pre-emergence herbicide, Eptam. Included are outlines of the crops on which Eptam can be used and types of weeds controlled by the herbicide, as well as efficient application methods. Copies are available without charge by

CIRCLING 47 ON SERVICE CARD

48—AGRIWET 9086

Nopco Chemical reports its Agriwet 9086 is a wetting agent designed to meet the needs of the toxicant formulator. The specialty product will wet out pesticide powders rapidly. A data bulletin recently published by Nopco describes Agriwet 9086. To get your copy

CIRCLE 48 ON SERVICE CARD

49—DIATOMITE MINERAL FILLER BULLETIN

A basic study of the characteristics and applications of Dicalite diatomite mineral fillers is provided in a new technical bulletin just released by the Mining and Mineral Products Div. of Great Lakes Carbon Corp. Among the applications described are in fertilizers and insecticides. The 12-page brochure includes a history of diatomite and a three-page section on its characteristics. For a free copy,

CIRCLE 49 ON SERVICE CARD

Process Equipment

50—PULVERIZING INSECTICIDES

Details of the Raymond line of insecticide grinding mills are included in a bulletin from the Raymond Div., Combustion Engineering, Inc. One major application for which Raymond whizzer-type Imp Mills are used is preparation of all common multi-component dusting formulations direct from the technical material, the manufacturer reports. For a bulletin giving complete information

CIRCLE 50 ON SERVICE CARD

51—MODERNIZATION

"59 Ideas for Modernization in '59" is the title of a 20-page booklet issued by Allis-Chalmers Manufacturing Co. "Modernization need not, and in most cases does not, describe the updating of an entire plant," the booklet explains. Purpose of the brochure is to point out ways that companies in various industries are finding to modernize or update their operations. A card attached to the booklet enables its reader to obtain more information on any of the 59 ideas presented. For your copy,

CIRCLE 51 ON SERVICE CARD

52—DUST-TIGHT VALVE

A new dust-tight valve for use with general equipment processing or storing dry solids, called the Solids Flow Valve, has been announced by Patterson-Kelley Co., Inc. Compact and stainless, the valve is designed for equipment used in blending, milling, conveying or other such operations where the discharge and flow of dry powders and granulations must be controlled. The valve is available in 8, 10 and 12 inch sizes, with 8¼, 10¼ and 12¼ inch openings and 10½, 12½ and 14¾ inch outside diameters. More information is available. Just

CIRCLE 52 ON SERVICE CARD

53—GRAPHITE PIPE BULLETIN

Falls Industries has issued a new bulletin describing its corrosion proof impervious graphite pipe and fittings, which are armored with fiberglass. The bulletin includes a table showing chemical resistance of impervite, advantages of the pipe and fittings, standards and methods of ordering. For your copy

CIRCLE 53 ON SERVICE CARD

54—STOKES DRYER CATALOG

A new four-page catalog just published by the Vacuum Equipment Div. of F. J. Stokes Corp. describes major design features of Stokes rotary vacuum dryers. Also listed are the practical working volume capacities, heating surface areas, dimensions and weights of the eight standard dryer models in the Stokes line. Free copies are available by

CIRCLING 54 ON SERVICE CARD

55—ROTARY BATCH MIXERS

Rotary batch mixers are described in a folder from Munson Mill Machinery Co. The four-page, two-color folder includes pictures and specifications of two types of mixers, Type 4 and Type 7. The Type 4 mixer is equipped with forced feed intake, lending itself to automatic or semi-automatic operation, Munson reports. The Type 7 uses a gravity intake and is most widely applied where reduction of ingredients is to be avoided at all costs. For a copy of the folder

CIRCLE 55 ON SERVICE CARD

56—SPRAY NOZZLE BULLETIN

S&K spray nozzles for spraying large quantities of liquids at low pressures are the subject of a new bulletin prepared by Schutte and Koerting Co. The nozzles produce medium to coarse, uniformly distributed, solid-cone sprays with a normal spray angle of 70°. The bulletin includes information on capacities, sizes, dimensions and materials of construction—plus photos showing the liquid spray distribution patterns of a nozzle operating at several pressures. Copies can be obtained by

CIRCLING 56 ON SERVICE CARD

57—DUST COLLECTOR BOOK

A 24-page illustrated book titled, "Industry Relies on Dustlube Collectors for Efficient Dust and Fume Control" is being offered by Wheelabrator Corp. Operating principles of Dustlube collectors are illustrated and explained. Difficult "hot and corrosive" applications such as ventilation of electric steel furnaces, granular fertilizer dryers and chemical fume collection are discussed. A copy can be obtained by

CIRCLING 57 ON SERVICE CARD

how to use the READER SERVICE CARD

- *Circle number of literature you want*
- *Print or type your name, position, company and address*
- *Clip and mail the Service Card*

58—GRANULAR FERTILIZER PROCESSING EQUIP.

"Renneburg Continuous Granular Fertilizer Processing Equipment," a 12-page, 2 color book, can now be obtained. Issued by Edw. Renneburg & Sons Co., the literature pictures and describes Renneburg's ammoniator-granulator, dryers, coolers, air handling systems and pilot plant equipment. A granular fertilizer unit flow sheet also is included. For your copy

CIRCLE 58 ON SERVICE CARD

59—HORIZONTAL MIXERS

"Horizontal Mixers," a new 12 page bulletin from The Young Machinery Co., gives dimensions for mixers up to 500 cubic ft. working capacity and shows various arrangements of ends, supports, agitators, shafts, glands, covers, inlets and discharges, gates and drives. The mixers can be furnished in carbon steel, stainless steel or other alloys. For a free copy,

CIRCLE 59 ON SERVICE CARD

60—THE TOTE SYSTEM

Use of the Tote System of bulk materials handling is the subject of a new 20-page booklet published by Tote System Inc. The booklet exhibits and describes Tote Bins, Tote Tanks, Tote Tilts and accessory equipment and tells how the system operates. A list of users and materials presently handled is included in the booklet. For your copy,

CIRCLE 60 ON SERVICE CARD

Materials Handling

61—NEW METHOD OF POWER APPLICATION

Detailed information on Towmostatic Drive, Towmotor Corp.'s new method of power application for fork lift trucks, is available in a 12-page booklet released by the company. Based on the principle of Hydrostatics, Towmostatic Drive is reported to lessen driver fatigue by simplifying lift truck operations. The booklet explains the unit's operational features, and illustrates and describes its chief components. Copies of the booklet are available by

CIRCLING 61 ON SERVICE CAPD

Packaging

62—PRINTING ON CORRUGATED BOXES

Hinde & Dauch reports the newest addition to its Little Packaging Library series, "How To Use Printing on Corrugated," contains information to help manufacturers plan more effective printing on corrugated boxes and displays. Included is basic box design, selection of the type of corrugated board, background, copy, illustrations, number of colors and typography. Also provided is information on how to achieve better identification, how to build a brand image and point-of-sale displays. A copy is yours, just by

CIRCLING 62 ON SERVICE CARD

See pages 54 and 55 for information on these Reader Service numbers:

72—Automatic Bag Closer
73—Stedman Test Lab
74—New TeeValve
75—Bag Closure System

Application Equipment

63—FLOMAX PUMP

Recommended for transferring or spraying liquid fertilizers, the Flomax 8 centrifugal pump's all-iron construction permits it to withstand corrosive effects of liquid plant foods, reports its manufacturer, Marine Products Co. The Model 8 is self-contained with its own gasoline engine and requires no power take-off connection. More information is available.

CIRCLE 63 ON SERVICE CARD

64—MOBILE BLENDER

Free literature on Highway Equipment Co.'s New Leader Model L-42S mobile blender now is available. Engine driven, the mobile blender can blend and spread three different fertilizers while in the field. The illustrated brochure describes construction features, optional attachments and specifications. A copy will be mailed to you if you

CIRCLE 64 ON SERVICE CARD

65—KAW TRUCK SPRAYER

A circular on its No. 1000 Truck Sprayer has been issued by Kaw Fertilizer Service, Inc. The pump unit is in kit form and can be mounted on any truck with P.T.O. Booms and the 1,000 gallon capacity tank are on skids, and can be removed from the truck to free it for other use. The circular will be sent to you if you

CIRCLE 65 ON SERVICE CARD

Miscellaneous

66—SAMPLING DEVICE

The Golden Thief vacuum pump "steals" pure samples of liquids and some powdered solids from tanks, drums and other containers by drawing the liquid into laboratory bottles or cans, according to W & W Mfg. Co. Among its applications: sampling liquids for quality control, transferring safely acids from original containers to smaller containers and removing water from fuel tanks of tractors, trucks, materials handling equipment. Standard Golden Thief models are made to screw on bottles from 1 ounce to 1 gallon and on cans from ¼ pint to 5 gallons, depending on size base of the pump ordered. More information on models is obtainable by

CIRCLING 66 ON SERVICE CARD

67—MOISTURE TESTER

With the Ohaus Model 6000 moisture determination balance, moisture content of a wide variety of materials can be determined rapidly, simply and accurately, according to Ohaus Scale Co. In addition to moisture determination, the balance can be used for direct weighing up to 10.0 grams with a sensitivity of 10 milligrams. For more information

CIRCLE 67 ON SERVICE CARD

—U.S. TESTING SERVICES

A new six page bulletin describes the complete line of laboratory and field testing facilities available from United States Testing Co., Inc. Included in the bulletin is a detailed description of the company's engineering facilities and services, which cover a broad range of subjects, from environmental studies to electronics, instrument calibration and reliability testing and failure analysis, as well as organic and inorganic chemical services. For your copy,

CIRCLE 68 ON SERVICE CARD

69—DATA PROCESSING FOR SMALL BUSINESS

A new, low-cost system of punched-card data processing deigned for small business has been announced by Remington Rand Univac Div. of Sperry Rand Corp. The system makes it possible for small companies, or branches and plants of larger ones, to machine process such accounting work as production control, payroll, inventory control, accounts receivable and sales analysis. The system consists of four basic pieces of equipment—alphabetic punch, sorter, alphabetic tabulator and summary punch, and reproducing punch. More information is available.

CIRCLE 69 ON SERVICE CARD

70—ROLLER BEARINGS

A new line of self-aligning spherical roller bearings is the subject of a book recently issued by Link-Belt Co. Features of the line are maximum diameter and quantity of convex rollers for each bearing size; precision machined centrifugally-cast bronze retainers and high, heavy inner race shoulders. The new bearings are being introduced in series 22200 and 22300, in bore sizes ranging from 1.5748" to 11.0236" with dynamic load ratings up to 288,000 pounds, the manufacturer reports. To obtain your copy of the book,

CIRCLE 70 ON SERVICE CARD

71—SPECTROPHOTOMETERS

Performance and versatility features of the Beckman DK Double-Beam Ratio Recording Spectrophotometers are illustrated in a new brochure published by Beckman Instruments, Inc. The 12-page brochure also lists specifications, application data and accessories for the DK-1 and DK-2 spectrophotometers. For copies,

CIPCLE 71 ON SERVICE CARD

SULFUR INDUSTRY SHOWED GAIN TOWARD END OF '58

Consumption of sulfur toward the end of 1958 registered an increase over earlier months, but the gain was not enough to bring the annual rate to the 1957 level.

In an annual review, Charles A. Wight, president of Freeport Sulphur Co., attributed the decreased use of sulfur to the decline in business activity.

Preliminary data indicate that total domestic consumption of sulfur was off fractionally from 1957, reflecting the lower output of such major consuming industries as paper, steel, petroleum refining, rubber and textiles. However, Wight reported that the relatively good year experienced by the fertilizer industry and other segments of the chemical industry helped to bolster consumption.

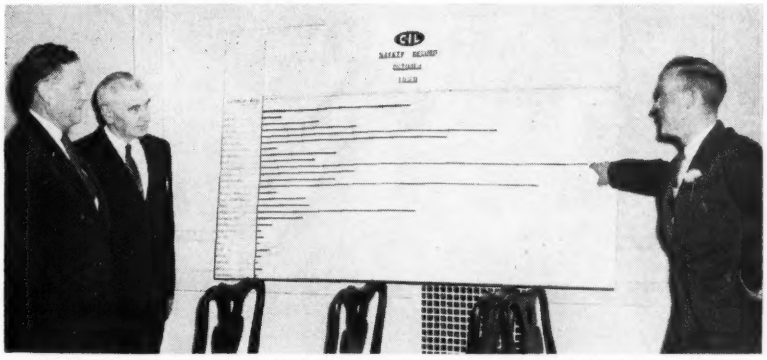
NEW TRADEMARKS FOR DUPONT WEED KILLERS

Two new trademarks have been adopted by Du Pont Co. for neburon and fenuron, members of the family of substituted urea herbicides. Changes in the use of the trademarks Karmex and Telvar for diuron and monuron also have been announced.

The new trademark Kloben now identifies neburon weed killers (formerly known as Karmex N), and the trademark Dybar now applies to fenuron weed and brush killers (formerly known as Karmex FP).

Telvar now will identify only products based on monuron, and Karmex will identify only products based on diuron.

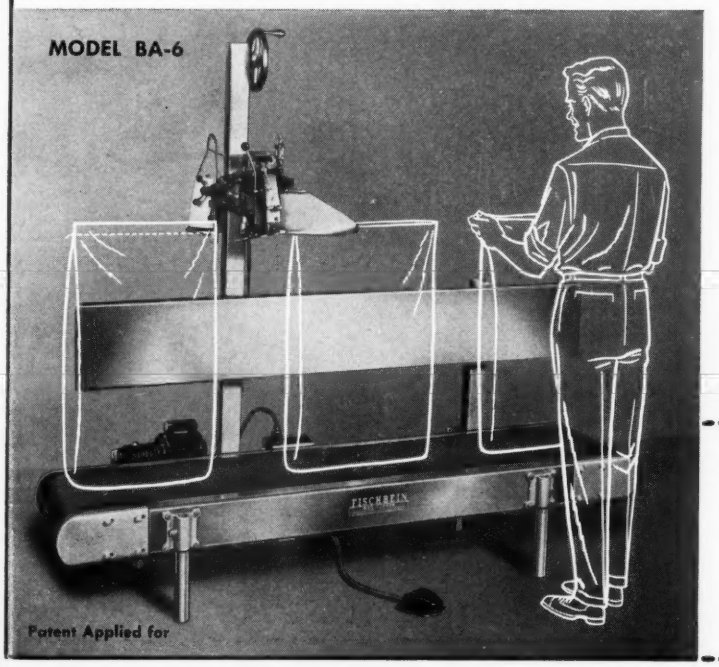
FIFTEEN ACCIDENT-FREE YEARS



John Cree (right), foreman at the Halifax, N. S., fertilizer plant of Canadian Industries Ltd., points with pride to the company's safety chart which shows that his plant has the longest safety record—more than 15 years (5,580 calendar days)—without a lost-time accident. This won for the plant its fourth successive C-I-L prize, highest award in the company's no-accident record plan. At left is L. V. Clegg, production manager of the C-I-L Agricultural Chemical Div. and A. B. Tolmie, manager of the Halifax fertilizer plant.

FISCHBEIN® *Automatic* BAG CLOSER

Large Plant Production . . . Small Plant Price!



- **Bag activates and completes sewing operation automatically.**
- **Simple mechanical operation . . . Simple installation.**
- **Sews at rate of 30 feet per minute.**

An automatic closing unit. The bags themselves start the sewing operation when they reach the sewing head. After sewing is completed, thread is cut automatically and sewing action stops as conveyor belt continues to move bag.

Write for details and complete catalog-file of Fischbein Bag Closing Equipment.

DAVE FISCHBEIN CO., DEPT. GE
2720 30th Ave. South, Minneapolis 6, Minn.

Name_____

Firm Name _____

Address_____

BURLEY BELT PLANT FOOD UNDER NEW OWNERSHIP

Burley Belt Plant Food Works, Inc. has been sold by Allen Peck of Sharpsburg, Ky., and Robert Terhune of Lexington, to Gilbert Nooe of Maysville, Ky., Herbert Moore of Cynthiana, Ky. and Albert G. Clay of Mt. Sterling, Ky., according to a recent report. Moore will serve as president, Clay as vice president and Peck and Terhune in advisory and sales capacities.

DUPONT AID TO EDUCATION IS ALMOST $1.2 MILLION

Grants totaling nearly $1,200,000 have been awarded to 139 universities and colleges in DuPont's annual program of aid to education, the company announced last month. The entire program is for fundamental research by universities and for strengthening the teaching of science and related liberal arts in the 1959-60 academic year.

People

American Agricultural Chemical Co. Following recent expansion and acquisitions, the firm has created three sales divisions:

WESTERN. J. W. Engle, former manager of the East St. Louis branch, is manager. The division comprises offices at Danville, East St. Louis and Fulton, Ill.; Seymour Ind.; Humboldt, Iowa, and Olathe, Kan. Engle will headquarter at St. Louis.

NORTHEAST. W. L. Beales, former manager of the Saginaw, Mich., branch, becomes manager. This division includes offices at Baltimore, Md.; Buffalo and Three Rivers, N. Y.; Carteret, N. J.; North Weymouth, Mass. and in Canada. Beales will locate in New York.


Beales

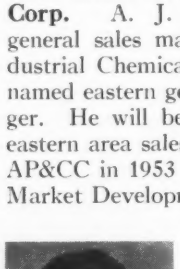

Engle

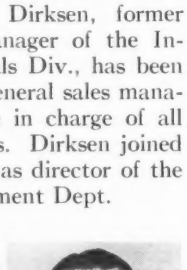
MIDSOUTHERN. C. R. Clemons, former manager at the Buffalo, N. Y. branch, will manage this division, comprising plants at Alexandria and Norfolk, Va.; Greensboro and Henderson, N. C.; Spartanburg, Charleston and Columbia, S. C., and Savannah, Ga. His headquarters will be at Greensboro.


Clemons

Also announced was appointment of C. W. Barbee as agronomist for Agrico's new Knoxville Fertilizer Div., and George H. Walker as assistant manager at the Cleveland plant.

American Potash & Chemical Corp. A. J. Dirksen, former general sales manager of the Industrial Chemicals Div., has been named eastern general sales manager. He will be in charge of all eastern area sales. Dirksen joined AP&CC in 1953 as director of the Market Development Dept.


Dirksen


Kolb

E. M. Kolb was named assistant to the vice president and will continue to be in charge of the company's potash activities. Kolb also was elected to the board of directors of the American Potash Institute.

Both men will continue to operate from the company's New York offices.

Dr. David R. Stern has been appointed manager of research at the Los Angeles plant, succeeding Harold Mazza who recently was promoted to plant manager of the Los Angeles facility.

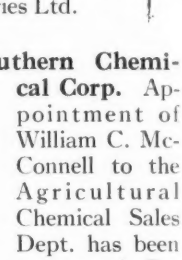
Chipman Chemicals Ltd. Newly elected president is J. H. D. Ross, who succeeds W. H. Moyer, named chairman of the board. Ross has been general manager since Chipman Chemicals Ltd. was reorganized in 1956 to merge its activities with the pesticide operations of Canadian Industries Ltd.


Ross

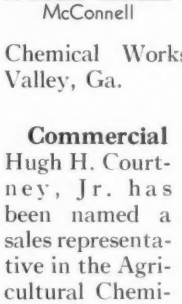
Columbia-Southern Chemical Corp. Appointment of William C. McConnell to the Agricultural Chemical Sales Dept. has been announced. Before joining C-S, McConnell was plant manager for Woolfolk Chemical Works Ltd. of Fort Valley, Ga.


McConnell

Commercial Solvents Corp. Hugh H. Courtney, Jr. has been named a sales representative in the Agricultural Chemicals Dept. Working from CSC's Atlanta, Ga., district office, Courtney will service fertilizer manufacturers in north Georgia, and parts of Tennessee.


Courtney

The Dow Chemical Co. T. H. Caldwell, Jr. has been appointed manager of the company's new sales office, scheduled to open Feb. 2 at 504 Wachovia Bank Bldg., Charlotte, N. C. Caldwell had been manager of automotive chemicals sales.


Caldwell

Chester E. Otis recently was named to the new post of sales manager, agricultural products, for Dow Chemical International Ltd., S.A. L. L. Coulter succeeds Otis as section head in charge of herbicides and fertilizer materials in Dow's Agricultural Chemical Development organization.

Freeport Sulphur Co. Election of Richard C. Wells as executive vice president has been announced. Wells will continue as president of National Potash Co., a jointly owned subsidiary.

The board of directors also elected three other officers: William B. Porterfield, Jr., assistant vice president, who had been vice president and sales manager of National Potash; and Palmer H. Evanson, and Robert M. McArthur, Jr., assistant controllers.

Geigy Agricultural Chemicals, div. of Geigy Chemical Corp. Vernon E. Anderson has joined the sales staff to represent Geigy in Wyoming, Colorado, Nebraska, Kansas and Missouri. Anderson received his masters degree in Economic Entomology from Iowa State College.

Anderson

International Minerals & Chemical Corp. Harry E. Moxley has been named superintendent of the fertilizer plant at Tupelo, Miss., succeeding T. L. Holland who has retired after 33 years with IMC.

Moxley, who had been assistant superintendent at the plant since 1954, joined IMC in 1951 upon gradulation from Alabama Polytechnic Institute.

Merck & Co., Inc. Albert W. Merck has been appointed assistant to the executive vice president. His responsibilities will be principally in the area of company marketing problems.

Frank W. Warren, regional agricultural sales manager for Merck's Chemical Div., heads the new 13-state North Atlantic region, effective Feb. 1. Activities of this new region are centered in Teterboro, N.J.

Miller Products Co. Appointment of Keith Sime to the board of directors and his election as vice president in charge of sales has been announced. For 16 years Sime was northwest district manager for Chipman Chemical Co. A. J. Overton has been named assistant sales manager in charge of advertising and sales promotion.

Sime

Mississippi River Chemical Co. Ronnie R. Wheat has joined the Sales Dept., and will headquarter in Bowling Green, Ky. During the past eight years he has worked as a salesman for two fertilizer companies in Kentucky, MRC reports.

Wheat

Monsanto Chemical Co.'s Organic Chemicals Div. has increased the size of its agricultural chemicals sales staff by more than 100 per cent. The expanded sales force is marketing the division's packaged herbicides and insecticides, as well as technical grade chemicals for formulators.

Five new sales areas have been established:

WESTERN, with headquarters at San Francisco, Charles L. Fetzner, manager. Dan W. Ragsdale will serve southern California and Arizona, reporting to Fetzner. John G. Neckerman will cover the northwest portion of the district.

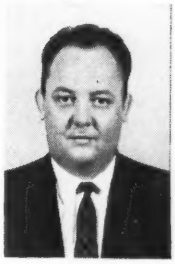
SOUTH CENTRAL, headquarters at Luling, La., Claiborne L. Barber, supervisor. Herbert C. Ploch will cover the northern portion and an additional representative will serve the Texas Rio Grande Valley.

NORTH CENTRAL, headquarters at Des Moines, Iowa, Robert L. Olcott, supervisor. Reporting to him are Donald D. Reichert, Minneapolis; Jack G. Rotramel, Columbus, Ohio; and an additonal salesman, to be based near Bloomington, Ill.

Fetzner

Barber

Olcott



Sherman

SOUTHEAST, headquarters at Orlando, Fla., Alwin C. Sherman, supervisor. A sales representative will be based at Raleigh, N. C.

NORTHEAST. Charles A. Leonard, of Harrisburg, Pa., continues to be responsible for sales in this area. He will eventually headquarter closer to New York City.

Charles P. Zorsch, manager of farm chemicals sales, has been named to the new position of merchandising manager for agricultural chemicals.

Three sales specialists also were named to the enlarged department: R. R. Wangerin, J. M. Magner and Dr. Earl C. Spurrier. They will operate from the division's St. Louis office.

Pacific Coast Borax Co. Div. of U. S. Borax & Chemical Corp. has added Don H. Gravlee to its Agricultural Sales Dept. He will cover the Southeastern territory with headquarters at Atlanta, Ga., handling sales of borate herbicides and

Gravlee

sodium-calcium-borate fire-retardant compounds.

Stauffer Chemical Co. J. Basil Bowers joins the Sales Development Dept., Agricultural Chemicals Div. Previously, Bowers was head of the plant pathology department at Stauffer's agricultural research laboratories in Mountain View, Calif.

The Texas Co. John L. Lugli has been appointed senior engineer in the Petrochemical Dept.

Virginia-Carolina Chemical Corp. John Kirtley, vice president of the Texas Gas Transmission Co., has been elected a director, succeeding William H. Wilson, former president of V-C, who resigned from the board.

Calendar

Feb. 13, 16, 18. Maryland Pesticides Conferences: Feb. 13 at Salisbury State Teachers College, Feb. 16 at La Plata and Feb. 18 at Frederick.

Feb. 24-25. Alabama Pest Control Conference, Alabama Polytechnic Institute, Auburn.

March 4-5. Annual Weed and Insect Conference, Fonner Park, Grand Island, Neb.

March 3-4. Western Cotton Production Conference, Hotel Westward Ho, Phoenix, Ariz.

March 10-11. Canadian National Packaging Conference, sponsored by Packaging Assn. of Canada, King Edward Hotel, Toronto.

March 17. Western Agricultural Chemicals Assn. Spring Meeting, Hotel Miramar, Santa Barbara, Calif.

March 17-18. Air and Water Pollution Abatement Conference, sponsored by Manufacturing Chemists' Assn., Netherland Hilton Hotel, Cincinnati, O.

April 5-10. American Chemical Society National Meeting, Boston, Mass.

April 13-17. Chemical Progress Week.

June 9-10. Association of Southern Feed and Fertilizer Control Officials 17th Annual Convention, Velda Rose Motel, Hot Springs, Ark.

June 14-17. National Plant Food Institute Annual Convention, The Greenbrier, White Sulphur Springs, W. Va.

Associations Meetings

SANDERS HEADS ACS FERTILIZER DIVISION

M. D. Sanders, director of research and development of Swift & Co.'s Agricultural Chemical Div., has been elected chairman of the American Chemical Society's Division of Fertilizer and Soil Chemistry for 1959. He succeeds Dr. Kenneth G. Clark of USDA.

Travis P. Hignett of TVA was named chairman-elect of this ACS Division, and John O. Hardesty of USDA is secretary-treasurer.

Dr. Albert L. Elder, director of research of Corn Products Co., has been chosen president-elect of the Society. Elected in a nationwide mail ballot, Elder will head ACS in 1960. President for 1959 is Dr. John C. Bailar, Jr., professor of inorganic chemistry at the University of Illinois.

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FERTILIZER USE UP 10% IN INTENSIFIED PROGRAM AREA

Fertilizer consumption in 1958 jumped by 16,213 tons for a 10.1 per cent increase in the six-county intensified fertility area of South Central Georgia.

Plant nutrient consumption increased by a phenomenal 17.5 per cent in 1958 as compared with 1957. All of this increase was within the six-county area, although statewide fertilizer consumption figures showed a drop of more than one per cent from 1957 to 1958.

These and other figures were included in a report presented by Dr. R. L. Wehunt, extension agronomist, at the annual meeting of the Georgia Plant Food Educational Society. The intensified soil fertility program was initiated in the fall of 1957 by the Georgia Agricultural Extension Service.

Dr. Wehunt attributed the program's success to good organization, the team approach and enthusiasm of participants. He said soil samples taken in this area increased from 2,000 in 1957 to 10,014 in 1958—an increase of more than 600 per cent.

The campaign also has resulted in increased use of lime. Suppliers in the six-county area have indicated that lime consumption is up 300 to 500 per cent.

The National Plant Food Institute is supporting this program through grants-in-aid and by supplying visual aids for use in the 26 county area.

FERTILIZER SECTION, NSC, OFFICERS ANNOUNCED

In January it was announced that George L. Pelton of the Smith Agricultural Chemical Co. is general chairman of the Fertilizer Section, National Safety Council. Vice-chairman is Elmer C. Perrine of Nitrogen Division, Allied Chemical Corp., and secretary is Ansell I. Raney, Phillips Chemical Co.

DEL-MAR-VA FERTILIZER GROUP ELECTS OFFICERS

Nash Strudwick of the Wm. B. Tilghman Fertilizer Co. was named president of the Del-Mar-Va Peninsula Fertilizer Association at its December meeting. Serving with him are vice president—William Blank, Worcester Fertilizer Co.; secretary—John S. Neild, Jr., Dorchester Fertilizer Co.; and treasurer—Bond Truitt, Worcester Fertilizer Co.

RECENT NPFI GRANTS

A $2,000 grant has been made by the National Plant Food Institute to the Agronomy Dept. of the Georgia Agricultural Extension Service, University of Georgia, at Athens, to demonstrate the value of using recommended rates of mixed fertilizer and nitrogen on pastures and corn.

A $2,500 NPFI grant to the Alabama Agricultural Experiment Station at Auburn will support research directed at improving soil test methods.

CORN CONTEST WINNER TOPS 200 BUSHELS

Thirteen Grant County, Washington, farmers received certificates for producing more than 120 bushels of corn an acre at a banquet in Moses Lake recently.

Winner of the Five-Acre Corn Contest, sponsored by the Grant County Extension Service and the National Plant Food Institute, was Percy Driggs with 200.8 bushels of corn an acre. In second place was Lynn Whitaker with 191.9 bushels an acre.

AERIAL RANGE FERTILIZATION RECOMMENDED AT CONFERENCE

Aerial application of nitrogenous fertilizer to obtain additional livestock use of lightly grazed rangeland was highly recommended by Dixie Smith, Wyoming University agronomist, at a recent Western Range Fertilization Conference. Attended by ranchers, agriculturists and fertilizer industry representatives, the conference was cosponsored by the National Plant Food Institute and the California Fertilizer Association.

"A significant increase in forage utilization on aerially fertilized areas has been shown from experimental studies conducted in the Big Horn Mountains of Wyoming in 1956 and 1957," according to Dr. Smith. These areas were fertilized at the rate of 67.5 pounds of nitrogen an acre.

Increased forage production also results from aerial fertilization, the agronomist reported. "Forage production on our fertilized experimental plots averaged 1,899 pounds of oven-dry forage; that on unfertilized plots only 1,419 pounds," he said. "This amounts to an increase of almost 800 pounds per acre, a substantial increase."

"The use of aerially broadcast fertilizers by private ranch operators or federally administered

Grant County Corn Champ Percy Driggs (holding trophy) tells how he got his 200.8 bushel yield per acre to Bill Raugust, Odessa Trading Co.; Jack McConkey, Wilson & Geo. Meyer; and Emil Nelson, agronomist, Prosser Experiment Station. The trophy was donated by local seed and fertilizer dealers.

lands may well become as generally established as the spraying of big sagebrush," Dr. Smith said, "if adequate economic data is supplied." He now is in the process of organizing a controlled grazing study for this purpose.

Joseph M. Urrutia, livestock producer of Friant, Calif., reported an increase of 365 pounds of beef an acre, or 180 per cent, from range fertilization. He capitalized the gain at $11 an acre.

Above: Dr. S. L. Tisdale presents the Agronomy Achievement Award to Clemson student William J. Weeks, Jr. **Right:** Albert Plant of Colorado State is awarded a $200 prize as "Outstanding Senior in Agronomy" by Dr. Richard Bahme.

NPFI AGRONOMY AWARDS TO TWO COLLEGE STUDENTS

▶ William J. Weeks, Jr. was first recipient of the Agronomy Achievement Award which will be made annually to the outstanding student in agronomy at Clemson Agricultural College. Sponsored by the National Plant Food Institute, the award includes $200 and an engraved key. A plaque will be retained in the offices of the agronomy department.

The award was established this year at Clemson through the cooperation of Dr. G. H. Collings, head of the department of agronomy, and Dr. S. L. Tisdale, NPFI southeastern regional director. Dr. Tisdale, who presented the award to Weeks, said, "this brings to five the number of agronomy achievement awards which are being made throughout the seven southeastern states."

▶ Albert Plant has been awarded a $200 prize at Colorado State University for winning the title of "Outstanding Senior in Agronomy." The prize is awarded annually by the Institute to a Colorado State University senior selected "on the basis of scholarship, leadership and promise of success."

Dr. Richard B. Bahme, western regional director of the Institute, presented the prize during the CSU Fertilizer Conference on Jan.6.

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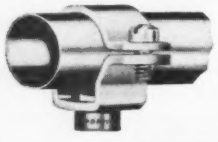

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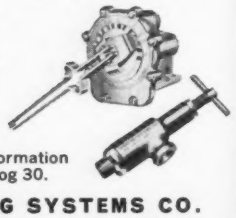

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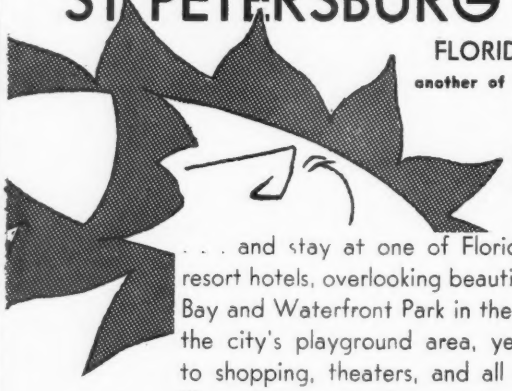

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Chemicals

U. S. PHOSPHORIC PRODUCTS BEGINS PRODUCING Di-MoN

U. S. Phosphoric Products Div., Tennessee Corp., is constructing a plant at East Tempa, Fla. for production of a modified diammonium phosphate, to be marketed under the trade name Di-MoN.

A granular material, 95 per cent of which is in the range of 6-16 mesh, Di-MoN is produced and sized for use in mixing, granulation and direct application to the soil, its manufacturer reports. The product is made from wet process phosphoric acid, with plant food content approximately 95 per cent water soluble. Analysis of the new product is 18-46-0.

The new plant, expected to be on stream April 1, 1959, will utilize a process developed by the research and development laboratories of U. S. Phosphoric Products.

For the past year and a half, Di-MoN has been produced in pilot plant quantities on a continuous basis. Bulk and bagged carload lots have been shipped to fertilizer manufacturers for experimentation in their processing equipment. The product has been used successfully in complete granulation units, batch type granulators and dry mixing, in commercial quantities, U. S. Phosphoric Products reports.

Among the analyses successfully produced, using a variety of phosphatic, nitrogenous and potash materials for complete formulation, are 5-20-20, 6-24-24, 10-20-20, 8-24-24 and 15-15-15.

RESISTANCE PLUS

University of California scientists are raising large colonies of Pacific mites as food supply for beneficial insects—beetles about the size of a pin head—that will be released into California citrus and avocado groves this spring.

The mixture found most encouraging to mite growth: *oranges dusted with kapok and DDT*. Mites are being raised at the University's Riverside Citrus Experiment Station in specially constructed rearing chambers.

GEIGY OFFERS IRON CHELATE ON VERMICULITE

Geigy Agricultural Chemicals, division of Geigy Chemical Corp., has announced availability of Sequestrene NaFe Iron Chelate on Vermiculite.

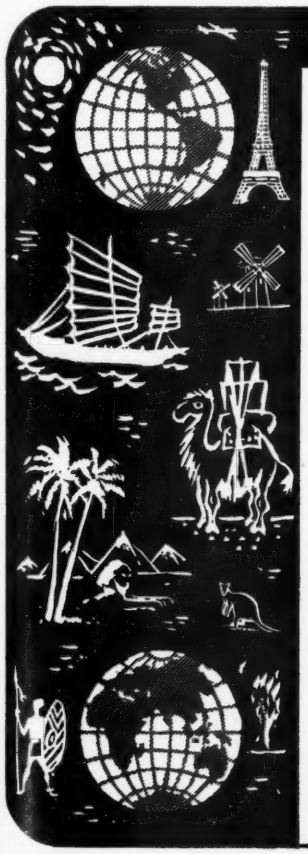
This new formulation provides iron chelates in convenient form for correction of chlorosis in citrus, ornamentals, turf and crops growing in acid soils, Geigy states. It contains 5 per cent iron as metallic.

Sequestrene Iron Chelate on Vermiculite is granular, free-flowing and dustless. It does not adhere to foliage and there is no danger of burn, Geigy reports. The product can be used alone or mixed with fertilizer.

CARBIDE WILL MARKET SEVIN TO FORMULATORS THIS YEAR

Sevin, a carbamate insecticide, will be available to cotton growers this year for use in the control of all major cotton insects, according to Dr. R. H. Wellman, manager, Crag Agricultural Chemicals, Union Carbide Corp.

Dr. Wellman said favorable re-



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sults from this year's widespread field tests now make it possible to market the new insecticide for general commercial use.

Union Carbide will supply a Sevin 50 per cent dust base to cotton pesticide formulators, most of whom will produce dusts containing 5 to 10 per cent Sevin.

Liquid formulations of Sevin are now being tested, and will probably be available for spray application in the future.

EMPLOYMENT OPPORTUNITIES

SALES MANAGER for old established company operating in California & Arizona handling Insecticides, Herbicides and Fertilizers—Salary open—Please send detailed resume to Box 670, care FARM CHEMICALS, 317 N. Broad St., Philadelphia 7, Pa.

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Ferguson Fumigants, Inc., of St. Louis, Mo., seeks aggressive and capable man to supplement its sales and service force. Applicant should be able to accept responsibility in rapidly expanding company. College education in biological sciences desired but not required if you have sufficient experience in mi'ling or grain industry. Preferred age approximately 30 to 40 years. Willing to travel extensively. Car furnished. Excellent working conditions and employee benefits. Advancement opportunities. Salary commensurate with experience and ability. Send complete resume. All replies handled in confidence. FERGUSON FUMIGANTS, INC., P. O. Box 5868, Ferguson 21, Missouri.

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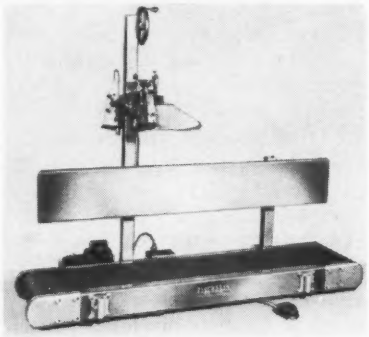
Equipment Supplies

FISCHBEIN INTRODUCES AUTOMATIC BAG CLOSER



New Fischbein Bag Closer, series BA, is designed so that the bags themselves start the sewing operation when they reach the sewing head, reports Dave Fischbein Co. After sewing is completed, the thread is automatically cut and sewing stops as the conveyor belt continues to move the bag.

Both the conveyor belt and sewing machine have instantaneous start/stop controls. A complete catalog-file of Fischbein bag closing equipment is available.

CIRCLE 72 ON SERVICE CARD

NEW STEDMAN TEST LAB

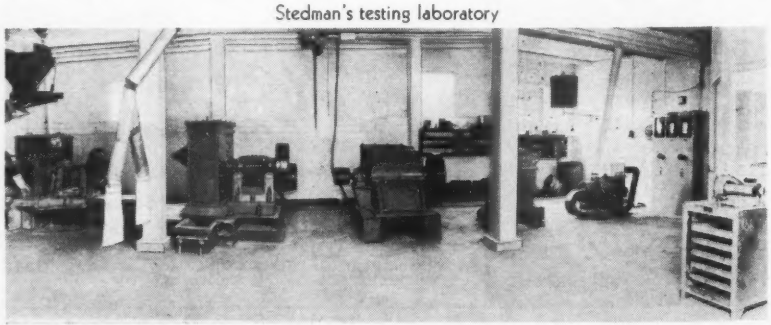
In its new testing laboratory at Aurora, Indiana, Stedman Foundry and Machine Co., Inc., has installed full-size production machines and automatic recording instruments to determine h.p. requirements, speeds and capacities with various materials tested. Screen analysis and product samples are furnished to prospective customers.

A wide variety of materials, such as chemicals, minerals, stone and gravel, can be analyzed in the laboratory. It includes full-size hammer mills, impactors and cage disintegrators. The best type of crusher or pulverizer to meet particular requirements can be determined.

Use of the new Stedman Testing Laboratory is open to readers of FARM CHEMICALS without obligation or cost. For details

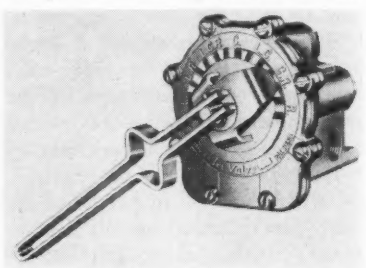
CIRCLING 73 ON SERVICE CARD

Stedman's testing laboratory



TEEVALVE INCLUDES NEW CONTROL HANDLE

Spraying Systems Co. has announced changes in its line of Tee-Valves for selective spray control in boom spraying. Design of the operating control handle has been modified to provide a hand grip "stop," so that position of the



operator's hand will remain clear of the valve, preventing accidental chafing of fingers.

A choice of seven valve positions gives every operating combination required with a two or three section boom, according to the manufacturer. For more information

CIRCLE 74 ON SERVICE CARD

NEW BAG CLOSURE SYSTEM BY CHASE

A new bag closure system called Chase Moistite now makes possible an absolutely moisture proof closing of both ends of bags for ammonium nitrate, ammonium sulfate and other products requiring maximum moisture protection, reports Chase Bag Co.

Chase now offers multiwall paper

bags made with this new tape-oversewn closure and complete Moistite units for closing filled bags in the user's own plant.

The Moistite closure cannot be torn off a bag without pulling part of the outer ply of the bag with it, according to the manufacturer.

For detailed information on the new closure and how the Moistite unit adapts to existing bagging equipment,

CIRCLE 75 ON SERVICE CARD

Government

PINE FERTILIZATION STUDIED AT N. C. STATE

A research study on fertilization of loblolly pine trees is underway at North Carolina State College. The study is being carried on jointly by the college's School of Forestry, its Experiment Station and Allied Chemical Corp.

Questions to be worked on are: 1. Under what conditions will it pay to fertilize trees? 2. What is the minimum amount of nutrients a tree can have in its foliage without being limited in growth by "hunger"? 3. Is it possible to tell how much and what analysis fertilizer a tree needs by checking the nutrient level of soil and foliage? 4. Can you trigger a growth response by applying the fertilizer these tests indicate the tree needs?

Emphasis will be on developing techniques of diagnosis.

Project leader for the study is Dr. T. E. Maki, head of the college's Dept. of Forest Management. Dr. Harvey J. Stangel, chief agronomist of Nitrogen Division, Allied Chemical Corp.; Dr. Ralph McCracken of the Soils Dept., North Carolina State College; and Dr. David Mason, of the Dept. of Experimental Statistics, are serving as advisers for the project.

Dr. Maki, one of the country's leading authorities on forest tree nutrition, views the study as a possible break-through from experimental plot to commercial tree growing.

"We have shown through numerous experiments," Dr. Maki said, "that fertilizer will increase tree growth. Now we hope to determine how this knowledge can be put to practical use, exactly when, where and how a commercial tree grower should use fertilizers to realize the highest possible profit from his forest land."

GROUP ADVISES RESEARCH ON INSECTS, NEMATODES

Research to improve control of insect and nematode pests of fruits is a high priority need, according to members of USDA's Deciduous Fruit and Tree Nut Research and Marketing Advisory Committee who held their annual meeting in Washington, Jan. 5–8.

Studies are needed to screen insecticides with a broad range of effectiveness, are less hazardous to handle than some now being used and can be applied up to harvest time without leaving residues, the committee said. Better lures and traps are also needed, and better methods of biological insect control should be developed, they continued.

Nematode research should be concentrated on finding chemical methods of combating nematodes attacking stone fruits, walnuts, grapes and other small fruits, as well as on biological controls as the ultimate solution of the nematode problem, according to the committee.

Suppliers Briefs

Frontier Chemical Co. Div., Vulcan Materials Co. Dr. Bruce D. Gleissner joins the firm as vice president and technical director. Gleissner had been assistant general manager of Diamond Alkali Co.'s Chlorinated Products Div. and vice president of Diamond Black Leaf Co.

Gandy Co. Charles H. Starker has been appointed sales promotion director. Formerly, he was assistant manager of Los Angeles Chemical Co.'s Insecticide Div.

Hodag Chemical Corp. has formed a Technical Service Dept., headed by Yash Snider, research chemist.

St. Regis Paper Co. has named Robert F. Callahan manager of its Multiwall Packaging Div. sales office at Kansas City, Mo.

West Virginia Pulp and Paper Co. is planning further expansion of its converting operations which now manufacture into finished products nearly 25 per cent of the company's output of paper and paperboard.

May we analyze your legume inoculant line free of charge?

by Myron E. Lusk, President and Research Director, Kalo Inoculant Company

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In some cases, your profit can easily range as high as 51%. If you aren't making this kind of money on your legume inoculant line, I'd like to show you how.

Kalo can install a legume inoculant line for you if you do not have one. Or show you ways to bring your present line up-to-date.

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To arrange a meeting, merely clip this advertisement to your letterhead or call me personally. Mr. Myron E. Lusk, Kalo Inoculant Company, 525 Kentucky Street, Quincy, Illinois. BAldwin 2-7383.

PATENT REVIEWS

By Dr. Melvin Nord

PRODUCING FERTILIZER-GRADE AMMONIUM ACID SULFATE

U. S. 2,856,278, issued October 14, 1958 to Ulric B. Bray and Vanderveer Voorhees, assigned to Bray Oil Co., describes a two-stage process for manufacturing ammonium acid sulfate and diammonium sulfate from ammonia and sulfuric acid, using waste sulfuric acid sources such as acid sludge from the treatment of petroleum products.

As shown in Fig. 1, anhydrous ammonia and acid sludge are injected into mixing nozzle 25.

The rate of feeding ammonia and acid are controlled to produce ammonium bisulfate as the principal product. Sufficient excess ammonia may be employed to produce from 10 to 50 per cent of diammonium sulfate in the product, but excessive amounts of diammonium sulfate result in solidification of the product. The higher the temperature the more diammonium sulfate which can be tolerated, but excessive temperatures result in dissociation and decomposition. For most purposes, it is desirable to operate to produce a mixture containing about 20 to 30 per cent diammonium sulfate, the remainder being ammonium bisulfate, carbonaceous matter and other impurities.

Adding More Ammonia

When reaction chamber 10 is partially filled with melted ammonium bisulfate, additional ammonia and sulfuric acid can be introduced by lines 28 and 29 respectively, the ammonia being injected as liquid ammonia or ammonia gas beneath the surface of the fused ammonium bisulfate in the reactor. Under these conditions, with proper agitation, the ammonia reacts instantly with the ammonium bisulfate, converting part of it to diammonium sulfate which in turn is reconverted to bisulfate by the addition of acid through line 29. In this manner, the reaction is maintained continuously in reactor 10 and the introduction of ammonia and acid through mixing nozzle 25 can be discontinued. The body of fused sulfate therefore acts as a buffer for the reaction.

It is preferred to maintain a temperature in reactor 10 between about 250° and 400° F. Inasmuch as considerable water is usually present in the sulfuric acid employed, this is evolved as steam which is conducted by vapor line 11 to scrubber 12, where it is contacted with sufficient cooling water introduced by line 30 to absorb ammonium compounds usually carried over as dust in the hot gases from reactor 10. The steam and other gases are discharged from scrubber 12 by line 31. Valve 32 can be employed to maintain a back pressure on the system, if desired, thereby reducing the volume of the vapors carried out from reactor 10 and reducing the amount of cooling required in scrubber 12. Thus a pressure on the system of 10 to 50 p.s.i. can be employed with considerable advantage from

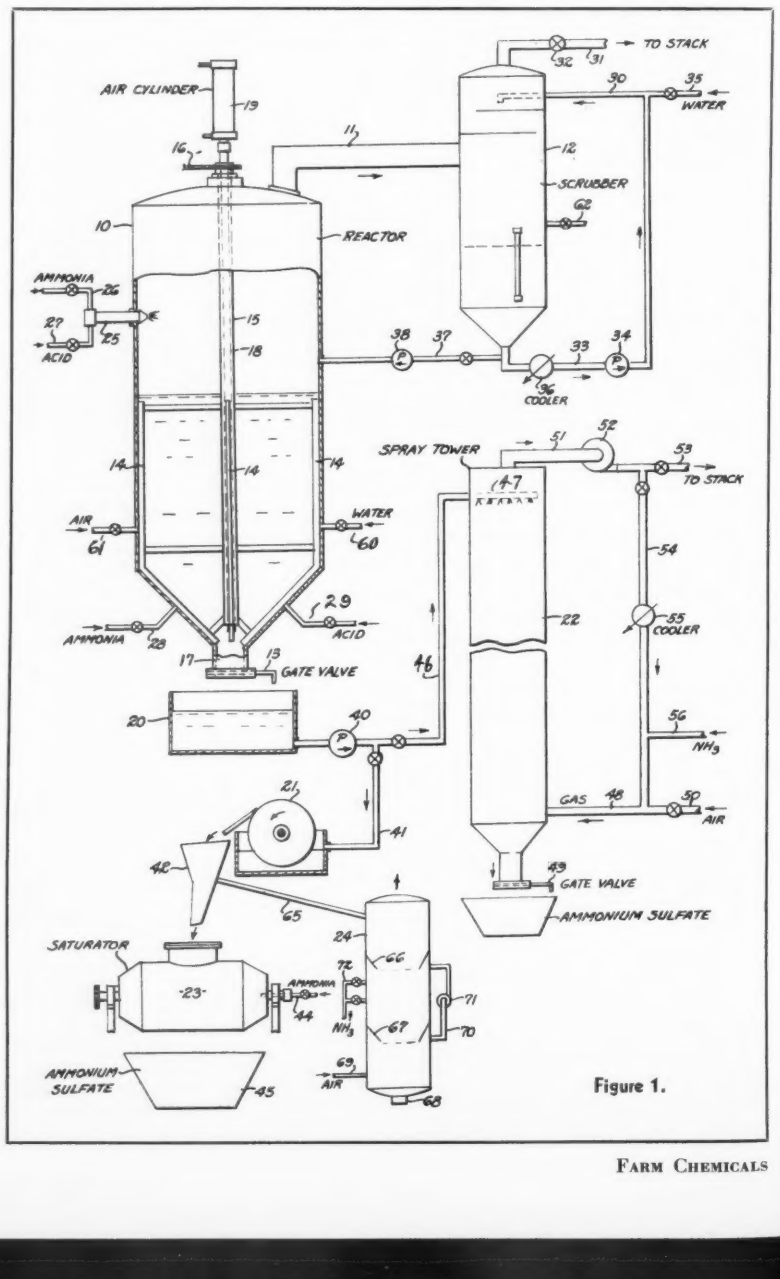


Figure 1.

the standpoint of heat economy, also increasing the fluidity of the molten bisulfate product.

The scrubbing liquid collected in the bottom of scrubber 12 is recycled by line 33 and pump 34, additional water being introduced as needed by line 35. Cooler 36 is provided to reduce the amount of water required to be added to the scrubber and heat obtained from cooler 36 can be usefully employed, for example, in making steam. As the concentration of ammonium salts in the scrubbing liquid increases, a portion of the scrubbing liquid is withdrawn from time to time or continuously, by line 37 and pump 38, and injected into reactor 10, where it is again evaporated and combined with the contents of the reactor.

Reactor to Flaking Drum

As the molten ammonium bisulfate accumulates in reactor 10, it is withdrawn, from time to time or continuously, by valve 13 into receiver 20 where it is conducted by pump 40 and line 41 to crystallizing or flaking drum 21. Drum 21 is supplied internally with cooling water and the ammonium bisulfate product congeals on the surface of the drum, falling into hopper 42, leading to saturator 23. Saturator 23 is a large cylinder mounted on trunnions provided with an inlet 44 for the injection of anhydrous ammonia gas, under pressure if desired. The saturator is closed after filling with bisulfate and then revolved while ammonia is injected, to complete the conversion into diammonium sulfate, which is thereafter discharged into receiver 45. Inasmuch as the reaction between ammonium bisulfate and ammonia gas is very rapid, it is also possible to effect neutralization or saturation of the bisulfate in a vertical tower 24, through which the ammonium bisulfate passes by gravity, as a moving bed. The ammonia gas is introduced at an intermediate point while air may be introduced at the bottom to scavenge any excess ammonia from the product and carry it upward into the mass of ammonium bisulfate which completely absorbs ammonia from the air in the upper part of the tower, the air serving to carry away the heat of the reaction.

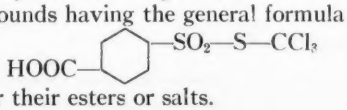
An alternative method of saturating the bisulfate product with ammonia is shown in the drawing in the form of spray tower 22. The molten ammonium bisulfate is conducted by line 46 to a distributor or spray 47 which introduces it in the form of small droplets from the top of a tall tower, 22, in the bottom of which a stream of ammonia gas is introduced by line 48. As the finely divided liquid bisulfate comes in contact with the ammonia gas in tower 22, it is converted into diammonium sulfate which is withdrawn at the base of the tower through gate valve 49. To prevent excessive heating and effect solidification of the product in tower 22, air can be introduced by line 50 and exhausted from the top of the tower by line 51 and fan 52, then discarded to the stack by line 53. However, where it is desirable to reclaim a part of the heat of neutralization, this can be done by recycling the gases in tower 22. Recycle line 54 is provided for this purpose. The heat exchanger or cooler 55, absorbs the heat from the recycle gases, and ammonia is introduced into the tower through feed line 56.

PESTICIDE PATENTS

U. S. 2,856,325, issued Oct. 14, 1958 to Carleton B. Scott and John W. Yale, Jr., assigned to Collier Carbon and Chemical Corp., describes the use of certain organophosphorus polymers as fungicides.

U. S. 2,857,306, issued Oct. 21, 1958 to Earl W. Gluesenkamp, Gail H. Birum, and William E. Weesner, assigned to Monsanto Chemical Co., describes new insecticides made by reacting phosphite esters with products derived by chlorination of trithane.

U. S. 2,857,307, issued Oct. 21, 1958 to Jan H. Uhlenbroek, assigned to North American Philips Co., Inc., discloses the use, as nonphytotoxic fungicides, of compounds having the general formula



or their esters or salts.

U. S. 2,857,308, issued Oct. 21, 1958 to Joseph W. Baker and assigned to Monsanto Chemical Co., discloses the use of O, O-di (halophenyl) phosphorodithioates for destroying nematodes in soil.

U. S. 2,857,309, issued Oct. 21, 1958 to William F. Barthel, discloses the use as insecticides of 2,4-dimethylbenzyl and 3,4-dimethylbenzyl esters of cis, trans, d, 1-chrysanthemumic acid.

U. S. 2,858,250, issued Oct. 28, 1958 to Robert J. Geary, discloses a pesticidal composition containing a water-dispersable lignin sulfonic acid.

HERBICIDE USE

U. S. 2,857,259, issued Oct. 21, 1958 to William E. Weesner and Philip C. Hamm, discloses the use of oil-in-water emulsions of formaldehyde 2, 4-dinitrophenylhydrazone as a pre-emergent herbicide.

U. S. 2,857,260, issued Oct. 21, 1958 to Henry F. Woodward, Jr., and assigned to Spencer Chemical Co., discloses the use of isopropyl-3-chloro-6-methyl phenyl carbamate as a selective herbicide.

U. S. 2,857,261, issued Oct. 21, 1958 to Milton Kosmin, and assigned to Monsanto Chemical Co., discloses the use of sulfoalkyl esters of phenoxyacetates as herbicides.

TREATING IRON CHLOROSIS

U. S. 2,854,791, and **2,855,285,** issued Oct. 7, 1958 to Joe Antognini, assigned to Stauffer Chemical Co., provides a method for treating iron chlorosis in plants.

It has been found that in many instances iron chlorosis is not brought about by any lack of iron in the plant, but because the iron is in a form which the plant cannot utilize. The invention provides a series of chemical compounds which make iron available to the plant, where it is already present either within the plant proper or on its leaves.

Aromatic sulfonium or phosphonium compounds (such as triphenyl sulfonium thiocyanate or tetraphenylphosphonium iodide) have been found to produce this effect.

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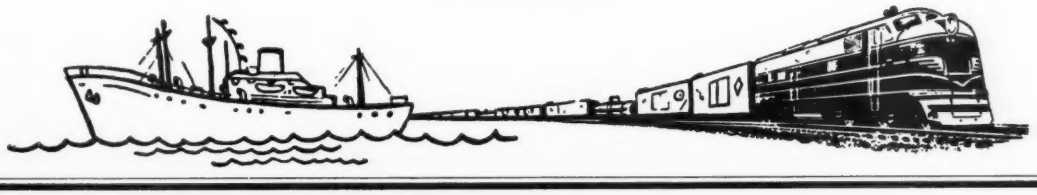

EDITORIAL

Needed: More ammunition for the "man on the firing line"

Why does a salesman go to school? Is it because his sales manager twists his arm—or is it due to an earnest desire on his part for professional improvement?

Well, if you know salesmen you can expect a different answer from each individual!

A full day of observing more than a hundred salesmen at the *first* Fertilizer Salesmen's School ever sponsored by the National Plant Food Institute, in Columbus, Ohio, convinced us that the future of fertilizer selling is in good hands. FARM CHEMICALS was present to see how a large group of salesmen would "cotton" to such things as Functions of Fertilizers and Fertilizer Materials, Production Potentials in Ohio, Socio-Economic Studies, Equivalent Fertilizer Rate Tables and so on.

Are these practical *selling tools* for fertilizer salesmen? To be honest about it, we were somewhat skeptical about this and even about the School's chances for success. But we were in a pioneering frame of mind. Just last month, this magazine had launched its new Marketing Approach with these words as our purpose . . .

". . . to provide the kind of marketing help that will help make it possible for you to sell more merchandise . . . *profitably!*"

Our program, like the NPFI Salesmen's School, emphasizes the importance of *the man on the firing line.* We assured you that we were going full steam ahead with our plans to provide you with more technical articles (we publish the Production Methods section each month), but the key to the farm chemical industry's main dilemma of oversupply and unstable pricing, as we said on this page last month, is a better marketing program—a vital part of which is the sales effort.

It doesn't make any difference what type of manufacturing techniques or product improvements you introduce in your plant . . . *if the merchandise remains on the shelf!*

Happily for everyone, the Fertilizer Salesmen's School proved to be a significant milestone in NPFI's illustrious history. FARM CHEMICALS salutes Russell Coleman, Raoul Alstetter, "Moe" Williams, "Zinnie" Beers, newcomers Arlan Woltemath and John Guttay—all of the NPFI—and Werner Nelson of the American Potash Institute for a monumental contribution in a field which is "crying" for help—fertilizer marketing.

We had the privilege of being briefed by NPFI instructors shortly before the School. We sensed the enthusiasm . . . the apprehension . . . yes, even the fears of those red-eyed individuals who had worked around the clock for several days in getting ready for the School (not to mention the weeks of work in developing materials).

What makes it even more dramatic is that all participants were not even in agreement on whether a salesmen's school was the *responsibility* of the Institute. But that didn't deter them in any way.

Actually, the "official" answer to that question will not be forthcoming for some time. But the School planners were given the "go-ahead" on an experimental basis by the nine-member executive committee back in December.

At this writing, no other meetings of this kind are scheduled—and the School will not be repeated *unless* the Board of Directors approves it following a complete review at the next regular Board meeting.

We on FARM CHEMICALS especially liked the way the NPFI team brought out the HOW of selling fertilizer *without offending even the most dynamic salesman* in the group. In a few words: the Salesmen's School went off like clock-work. There is a complete report of the School on page 14 of this issue.

Research clearly shows that farmers *need* to use more fertilizer than they are now using. This point was brought out dramatically in the School. Having observed the reactions of salesmen *on this one point alone* . . .

. . . FARM CHEMICALS *strongly recommends that the NPFI Board of Directors votes to extend this worthwhile program to other states at the earliest possible time.*

Because of the unusual enthusiasm shown by fertilizer salesmen in wanting to utilize the *selling tools* offered by the NPFI, we're satisfied that *they will translate this information into something the farmer can profitably put to use.*

And that means more fertilizer moving onto farms—and more profits for you.

Let's get behind this pilot program that *provides so much ammunition for the man on the firing line!*

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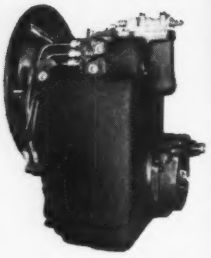

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